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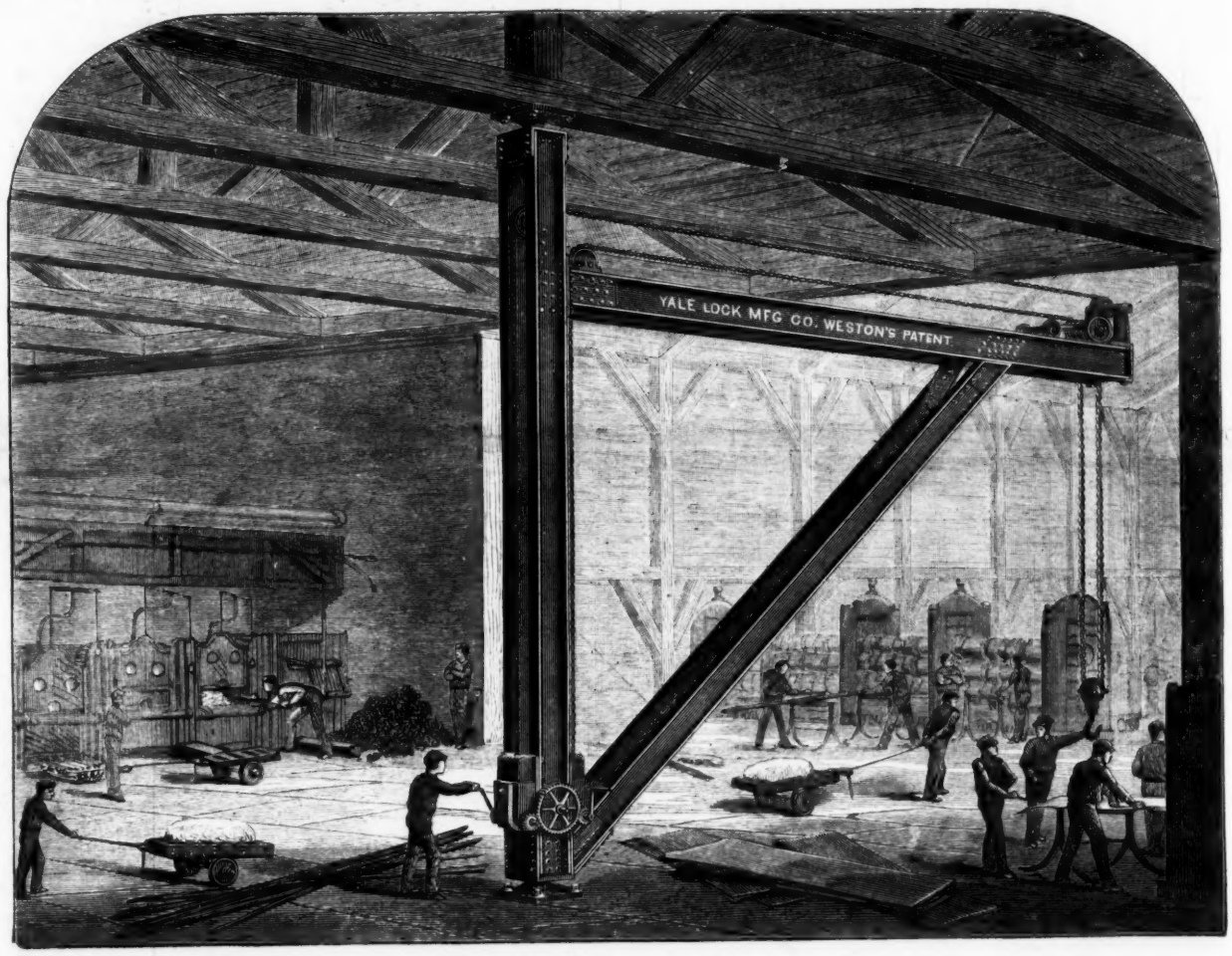
Weston's Hand Power Jib Crane.

The perspective view upon this page represents a new hand power jib crane made by the Yale Lock Mfg. Co., Stamford, Conn. This crane is intended principally for foundry purposes, but may be used wherever such a crane may be required. On pages 2 and 3 will be found detail engravings which will make the construction and operating mechanism of this crane plain to the reader.

This crane, as will be seen from the engraving, Fig. 1, consists of a wrought-iron frame, of which *A* represents the mast, *B* the jib, and *C* the brace.

These parts are made from what is known as channel iron, of such dimensions as to give a factor of safety of 6, or, in other words, with the maximum load suspended at the outer end of jib, the resulting strains on the channel irons composing the members of the frame shall not exceed one-sixth of the strength of the iron. All other parts of the crane which are subject to strains are proportioned with a like factor of safety. The hoisting mechanism consists of an ordinary running block *D*, with a hook for attaching the load, which is suspended by the chains, *X*, *Y*. The trolley, or truck *E*, is arranged to roll to and from the mast on the top of the jib *B*, upon flanged wheels, resting upon the top edges of the two channel irons forming the jib, the large wheels, *V*, *V*, on the front axle of the trolley serving to carry the load. The sheave *F*, around which the chain *X* returns, is supported by brackets at the end of the jib. The wheels, *H* and *Q*, are also used to guide the two parts of the chain downward.

The operating mechanism for raising the load, as well as for moving the trolley *E* in and out, is attached to the mast near the foot. This mechanism is contained within two housings attached to the opposite sides of the mast, as shown in Fig. 2. Passing through and supported by these housings are two parallel shafts, *N*, *O*, with squared ends for applying cranks. These shafts carry pinions, *J* and *K*, respectively, and either or both of these pinions may, by being shifted along the shaft, be caused to engage with a large spur wheel *L*, keyed fast upon an intermediate shaft *M*, which is also provided with a squared end for the application of a crank. Either of the pinions, *J*, *K*, when placed in or out of gear with the spur *L*, is held in position by the spring latch or key shown in Fig. 4. Whatever the position of the pinion, the key cannot be entirely removed, and is in no danger of being lost.



NEW HAND POWER JIB CRANE.

The worm wheel *P*, turns upon the spindle *W*, and has a pocketed chain sheave *R* bolted rigidly to it, as shown.

A worm located beneath this wheel upon the shaft *N*, and running in an oil-well, transmits motion from the shaft to the worm wheel when the cranks are turned. The arrangement of this worm is shown at *Q*. The mechanism in each of the two boxes is precisely alike, one being a transposed duplicate of the other. The two parts of chain, *X*, *Y*, Fig. 1, pass through the tops of the housings and engage with the two pocketed chain wheels, *R*, *R*, as shown in the sectional view, Figs. 3 and 5. These wheels have pockets in them to receive the links of the chain, so that as they revolve the chain is drawn in or paid out. The chain is prevented from slipping out of the pockets under all contingencies by the guards, *S*, *S*, and is likewise prevented from sticking in the pockets beyond the proper point of release by the strippers *V*. These strippers fit into the grooves of the chain wheels and compel the chains to leave the wheels at the proper points. Each part of the chain, as it descends and passes around the chain wheel *R*, returns up to the small guide wheel *T*, over which it passes downward into the box or receptacle for the chain, in the bottom of the mast, as shown in Fig. 5.

A single endless chain is thus used, the two parts of which, *X*, *Y*, pass upward from the housings and over the guide pulleys at the inner end of the jib, as represented.

The part marked *X* passes from the sheave *F*, at the end of the jib, thence to a sheave on the trolley, over which it turns and passes downward to the block *D*. The other part of the chain *Y*, passes from the guide sheave *H* directly to a sheave on the trolley, and thence turns downward to the block *D*, where it meets and unites with the part *X*. The two parts again come together after passing over the small sheaves, *T*, *T*, within the cavity *L*, at the foot of the mast.

Assuming that the pinion *J*, Fig. 2, is out of gear with the wheel *L*, and the pinion *K* in gear with it, the operation of this mechanism for hoisting and lowering is as follows: The rotation of the shaft *N* in one direction by means of a crank in the usual manner causes the part of the chain lettered *X* to be hauled in, the effect of which is simply to raise the block *D* and its attached load. Turning the shaft *N* in the opposite direction would produce the opposite result of lowering the block and load, in both cases the shaft *O* remaining stationary. In like manner turning the shaft *O* in one direction will cause the load to ascend, and turning it in the opposite direction will cause the load to descend, the shaft *N* remaining stationary. By applying cranks to each of the shafts *N* and *O*, and simultaneously rotating said shafts in opposite directions, both parts of the chain will be simultaneously taken in or paid out, thereby doubling the speed of hoisting or lowering. By applying a crank to the shaft *M*, the pinion *K* and shaft *O* will be caused to rotate more rapidly than the crank in the proportion of the diameter of the wheel *L* to to that of the pinion *K*, and a rapid hoisting or lowering motion thus obtained. A similar result would be effected by disengaging the pinion *K*, engaging pinion *J*, and turning the crank on shaft *M*.

The operations for traversing a load horizontally are as follows: By slipping both pinions *J* and *K*, into engagement with the wheel *L*, and applying a crank to the shaft *O* or the shaft *N*, the rotation of the crank will cause the shafts *O* and *N*, to rotate simultaneously at equal speeds in the same direction, thus causing the two worm-wheels and the chain-wheels attached to them to also rotate simultaneously at equal speeds. The two parts of the chain, *X* and *Y*, are received by the chain-wheels, *R*, *R*, upon opposite sides, so that the simultaneous motion of the latter causes one of the parts *X* to be paid out, while the other part *Y* is taken up simultaneously and at an equal rate. As a result, the trolley *E* will be caused to move inward on the jib *B*, the block *D* and its load remaining suspended at a uniform height. Reversing the motion of the crank, the part *Y* of the chain will be paid out and the part *X* hauled in equally, the result being the motion of the trolley outward on the jib, the load again remaining suspended at a uniform height. Two speeds of traverse of the trolley are obtained by applying the crank-handle either to the shaft *M* (for quick speed), or to either of the shafts *N* and *O* (for slow speed).

It will thus be seen that by means of one set of mechanism at the foot of the mast the hoisting and lowering of the load at three different speeds, and the traverse of the trolley on the jib in either direction at two different speeds each way, is readily accomplished.

The crane swings upon the bearings of its mast in the usual manner. In the crane shown in Fig. 1, the mast is extended to an unusual height above the jib in order to reach its bearing in the roof of a building while at the same time the jib is low enough to swing under a lower roof of the building.

Referring to the large detail illustration, Fig. 1, there may be noted the course of an endless wire rope, which, passing from the trolley *E*, over a wheel at the outer end of the jib, runs the length of the jib, passes over a wheel upon the same spindle as the wheel *Q*, and thence passes over the straining wheels *T* and *G*, and returns over a wheel on the same shaft as the wheel *H*, to the trolley *E*, to which its ends are fastened. This is a special feature applied to foundry cranes to prevent the slightest crawling of the trolley in hoisting and lowering, as any such movement might result in damage in

the work of setting copes and drawing patterns. The straining of the rope fixes the trolley firmly in position. It is accomplished by turning a handle connected with a short eccentric shaft, which draws the wheel *T* downward, and the passage of the rope over the wheel *G*, and back under a second groove of the wheel *T*, doubles the stress upon the rope and affords a means of adjusting its tension by changing the position of the wheel *G*. In this way a simple motion of a lever secures the trolley immovably in any desired position. For any ordinary use the attachment described is quite unnecessary, as the creeping of the trolley is an exceedingly slight movement in any case.

One of the peculiar merits of this crane rests in the fact that, in practice, one of the shafts, *N*, *O*, being more frequently used than the other, the endless chain moves through the mechanism more or less continuously in one direction, and thus distributes the wear uniformly over the whole length of the chain, an important consideration in durability as compared with cranes in which chains are wound upon drums or barrels, and in which short lengths of chain pass and repass repeatedly over the same chain wheels and become worn out, while other portions of the chain receive no wear at all.

By a simple mechanism applied to the two crank shafts, *N*, *O*, the load is held securely in any position. It cannot then run down nor can the handles fly back. It may be here remarked that the flying back of handles and the violent running down of loads are the cause of many serious and often fatal accidents which are all the while occurring from the use of ordinary mechanism. With this crane, the cranks must be turned to lower as well as to hoist, but the motion in either direction is very easy. There is no running away of the mechanism, but every movement is smooth, continuous and certain.

The bracing, riveting and connection of the several parts ensures practically equal resistance to strains throughout.

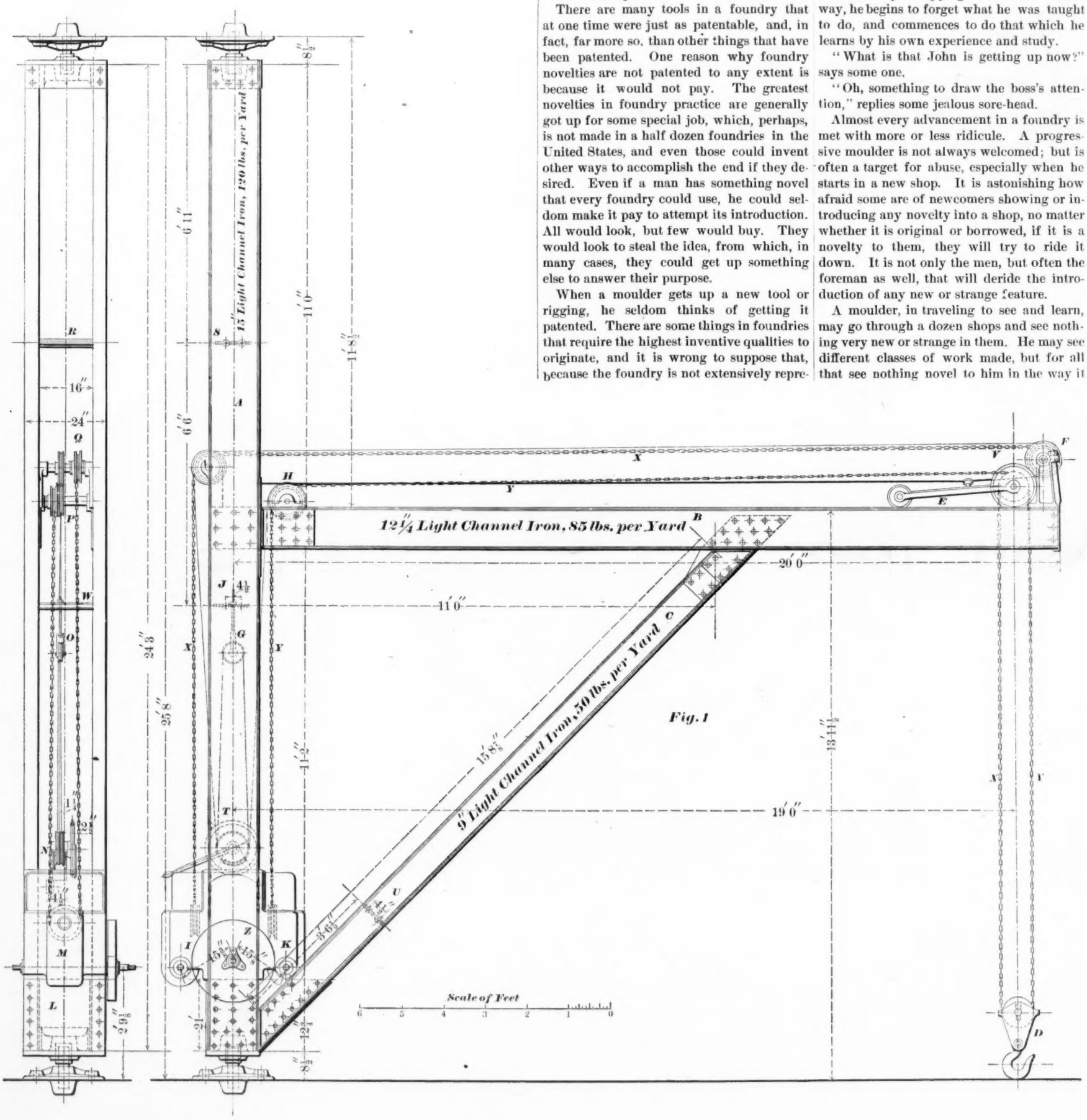

12¼ Light Channel Iron, 85 lbs. per Yard
9″ Light Channel Iron, 50 lbs. per Yard
15″ Light Channel Iron, 120 lbs. per Yard
Scale of Feet
6 5 4 3 2 1 0

Fig. 1

Novelties in Foundry Practice.

By Thos. D. West.

In the Patent Office buildings at Washington are many novelties, some good and some of very little value. Many of them are appliances for mechanical trades, and have been heralded before the public. In this line the moulder's trade has not been very prominent, whereby the public have been led to believe that, to do moulding, no inventive talent was required.

There are many tools in a foundry that at one time were just as patentable, and, in fact, far more so, than other things that have been patented. One reason why foundry novelties are not patented to any extent is because it would not pay. The greatest novelties in foundry practice are generally got up for some special job, which, perhaps, is not made in a half dozen foundries in the United States, and even those could invent other ways to accomplish the end if they desired. Even if a man has something novel that every foundry could use, he could seldom make it pay to attempt its introduction. All would look, but few would buy. They would look to steal the idea, from which, in many cases, they could get up something else to answer their purpose.

When a moulder gets up a new tool or rigging, he seldom thinks of getting it patented. There are some things in foundries that require the highest inventive qualities to originate, and it is wrong to suppose that, because the foundry is not extensively represented in the Patent Office, no invention is required there. If the getting up of something never before known is patentable, then there are foundrymen who every year of their lives could be applicants for patent honors.

Every tool or rigging now used in a foundry was at one time more or less of a novelty. Many moulders seem to have the idea that the trade was originated as they found it, and all that is required of them is to do as they see others do. The habits and customs of the shop in which they learned their trade are theirs. They get to think that there is only one way that a job can be done, and that is the way they were learned. What a deplorable condition the moulder's trade would be in were there no exceptions to this rule.

Once in a while we come across men who are original. They have, to our views, odd ways of working, and, if we are fortunate enough to be their shopmates for some years, we will often see them adopt new modes of working. Such a man cares nothing for what he was taught to do. To him it is only a stepping stone. Once under way, he begins to forget what he was taught to do, and commences to do that which he learns by his own experience and study.

"What is that John is getting up now?" says some one.

"Oh, something to draw the boss's attention," replies some jealous sore-head.

Almost every advancement in a foundry is met with more or less ridicule. A progressive moulder is not always welcomed; but is often a target for abuse, especially when he starts in a new shop. It is astonishing how afraid some are of newcomers showing or introducing any novelty into a shop, no matter whether it is original or borrowed, if it is a novelty to them, they will try to ride it down. It is not only the men, but often the foreman as well, that will deride the introduction of any new or strange feature.

A moulder, in traveling to see and learn, may go through a dozen shops and see nothing very new or strange in them. He may see different classes of work made, but for all that see nothing novel to him in the way it is made. It will seem as if one master taught them all. When first starting to work at the trade we must be taught by others, but should we wish to become leaders, we must keep it in mind that what we see done was not always so done, but was the result of the inventive and thinking powers of many men. That which others have given to us must be improved upon. Some one says we have nothing to accomplish; it has all been done. If this were so, then, to the writer's mind, the uncertainty that is attached to the making of good castings would be at an end The

novelties of the past have mainly been in the way of the introduction of appliances for making and forming moulds. The novelties of the future will be for the purpose of lessening the uncertainty of making good castings.

It would be a hard matter for a designer to make a pattern that could not be moulded by some one. If we look through a machine shop we can see castings of almost every conceivable form. These were made by some moulder, but how many times some of them had to be moulded in order to produce the one seen, is where the trouble comes in. Bad castings are nowadays chiefly caused by the improper handling of material and tools, the proof of this being that the same man will often bring forth good and bad castings by the use of the same tools and material.

To rightly handle materials and tools is not to be learned by watching others. You must have practice, coupled with intelligent study, if you succeed. To intelligently study any subject, it is always a great assistance to know what others think and know of it. To accomplish this exchange of ideas, there has lately grown up the novelty of foundry literature. There are men who scoff at this, who will before long see their error, or be made to feel it by the advancement of others over them.

There is a large field for the expansion of foundry literature, and whoever interests himself in it, cannot but be benefited by it.

The interest in this line is rapidly growing, being taken hold of by the best mechanics and workmen. The men that have originated the most novelties in foundry practice have been forced to do so through necessity. In out of the way foundries can often be found more real novelties than in many of our city shops. Foundries that are far away from others cannot borrow or steal ideas. They are forced to use their own brains. There are seldom two men that plan the same, therefore when moulders plan there must needs be variety.

There are few moulders but would be able to improve, or add something to, our trade, if they would only make up their minds to make it a study. We should all try to make the trade better than we found it, and remember that the present attainments of our trade only come to exist through progressive thought and study.

E. D. Leavitt, Jr., has accepted the position of consulting engineer to the firm of Henry R. Worthington, New York, manufacturers of pumping engines and steam pumps. Mr. Leavitt's headquarters will remain at Cambridgeport, Mass., as formerly, and he will continue to be connected with the Calumet & Hecla Mine, but the new arrangement places his engineering skill at the disposal of the Worthington establishment when occasion arises.

Disadvantages of the Eccentric upon Locomotives.

There are many people who speak of the modern locomotive as a model of perfection. It may so appear to persons who are unacquainted with the working details of the machine, but the fact is that there is still great room for improvement.

Since attempts have been made to run trains long distances at high rates of speed, without intermediate stops, various weaknesses have been developed.

Among the principal ones eccentric straps may be mentioned.

Upon regular high speed locomotives, in order to get the proper travel of valve, it is necessary to make the eccentrics about 15″ in diameter. The surface velocity of such eccentrics in the straps would be about 1,400 feet per minute, supposing the engine to run at a speed of 350 revolutions per minute. This movement, unlike the piston's in the cylinders, is continuous in one direction, therefore it is more difficult to lubricate the surfaces. Furthermore, the flying grit and dirt disturbed by the engine truck is thrown up and is caught between the surfaces of the eccentric and strap, which is thrown open at the bottom as the wheels revolve. This wear very soon becomes excessive, because, as the strap wears larger more dirt and grit accumulate, so that there is great danger of an accident. When the lost motion is taken up there is also danger of taking off too much, which will cause the strap to pinch upon two opposite sides of the eccentrics.

A short time since we were upon the fast express between New York and Boston, and were indulging the hope that we would complete our journey in good season, when the train came to a sudden stop in the wilderness.

We got out and walked forward, and found the engineer and fireman busily engaged in disconnecting the left-hand side. Upon inspection, we found that the forward motion eccentric strap upon that side had got so hot that it burst, requiring the engineer to work his engine with the right-hand side until he reached the next station, where a freight engine was procured, and the train proceeded about two hours late. The locomotive which broke down had balanced valves, so that it could not be claimed that the eccentrics were overworked in this instance. On the contrary, very little power was necessary to operate the valves; but the eccentric and strap both being of an irregular shape, could easily become heated by friction and cause trouble.

Eccentrics and straps, as now arranged upon locomotives, are, for the reasons stated above, decidedly objectionable for fast locomotives, and ought to be abandoned, especially while there are other mechanical movements to take their place with much less wear and tear, and which will work with much greater precision. Great care is usually taken in fitting up new eccentrics by turning, boring, and scraping. When the eccentric is finally set and made fast upon the axle, the effect of tightening the set screws and key is to spring the eccentric out of round. It may, therefore, be truthfully said that locomotive eccentrics are never round except when they are taken from the lathe when new.

No one will question the desirability of preserving the roundness of eccentrics, and of relieving them of the enormous strains put upon them by set screws and keys that tend to burst them. Where people are determined to use eccentrics, the better way to avoid undue strains would be to place a separate collar upon the axle for each eccentric, keying it fast.

The eccentric is to be held by bolts passing through a flange upon the collar, as well as through the eccentric itself, by means of which there is no danger or possibility of springing the eccentric, or of allowing it to slip. Neither is the axle gouged full of holes to admit the points of set screws to hold them.

This plan can be easily followed without alteration of the present construction of locomotives, and has been done in one instance that we know of. This plan is worth all it costs for preventing the slipping of eccentrics; besides, each eccentric can be moved to any desired position without the necessity of moving the rest, or in any way interfering with them.

These little details block our progress towards attaining higher speeds rather more than the larger and apparently more important problems. There is no reason why the valves of a locomotive should not be unloaded to such an extent that they may be easily operated by a simple combination of levers, which take their motion from some convenient position upon the main rod, thereby avoiding the use of eccentrics altogether.

There are several valve motions already in existence which embody these principles, some of which are soon to be thoroughly tested in this country.

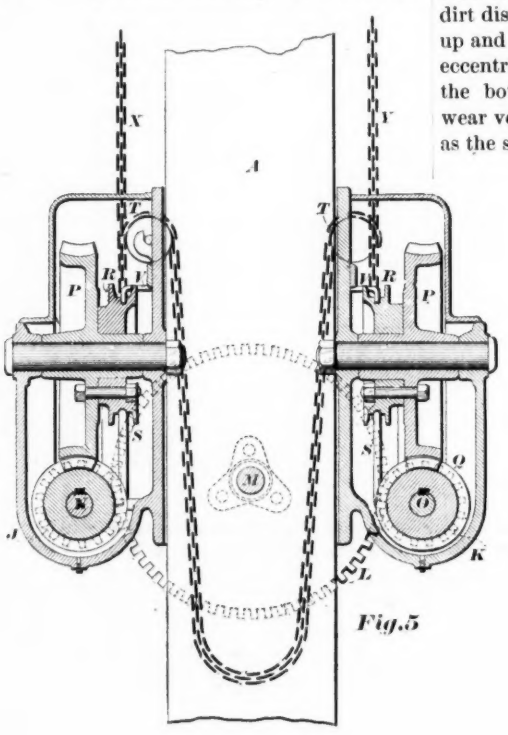


Fig.5

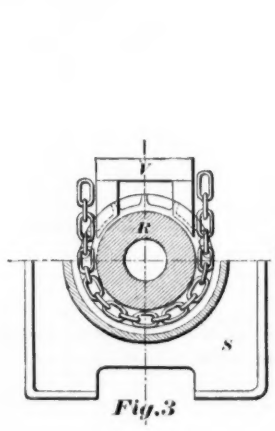


Fig.3

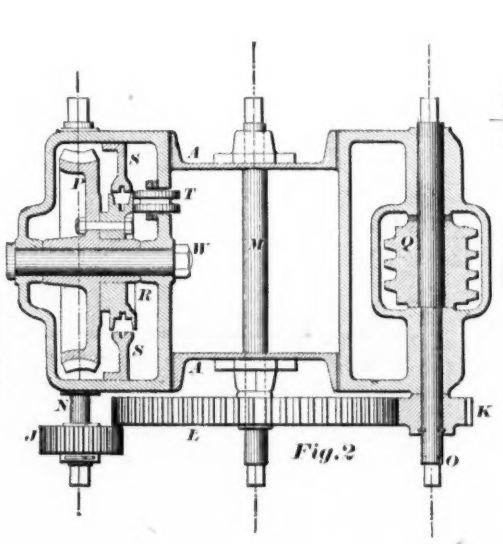


Fig.2

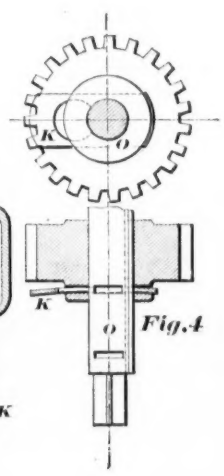


Fig.4

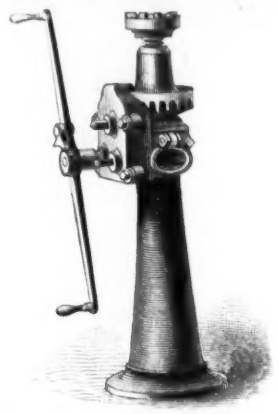
New Fifteen-Ton Car Jack.

Within the last few years a marked increase has been made in the weight of railway rolling stock. These changes have, quite as a matter of course, demanded corresponding changes in the entire railway system, particularly in the tools and appliances for handling rolling stock.

The accompanying illustration represents a new screw jack, more especially designed for raising one end of Pullman cars.

This jack has a lift of nineteen inches—sufficient to allow the truck, with its kingbolt, to be rolled under the body and into position. The body can then be lowered on the car.

As the lift is positive, and the rate of lifting regular, while the strength and construction leaves no chance of yielding or giving way, the timbers are not strained and twisted by the motion. These jacks are designed and made with a view to reduce the friction to the lowest practical limit, and we are informed that one man can easily lift fifteen tons with one of them.



New Fifteen-Ton Car Jack.

The St. Petersburg, Russia, correspondent of the London *Ironmonger* says:

"The naphtha question is becom'ng a 'burning' one. The Nobel Company have declared that they are prepared to go still lower than the present prices, if need be. The company are now selling, in Tzantzin, the best kerosene, equal to American, at 70 copecks per pood, or £4 5s. per ton, and masouta at 11 copecks per pood, or 14s. per ton, whilst the smaller producers declare the carriage to Tzantzin is quite 14s. per ton. It is now confidently stated that American oil and its various products are banished from Russian markets. Referring to the Caucasian oil trade, it is worthy of remark that the borings carried out on the other—the Asiatic—side of the Caspian, near the railway on the road to Merv, have proved a great success. One well, without any pumping, gives a regular flow of ten tons per day. The area of land found to be workable is over 1,500 acres, and it lies within thirty miles of the line of railway, to which it is now connected by 'horse railway.' It is supplying the fuel for all purposes on the railway. The engineers estimate the output of this new oil-field at 800,000 tons per year.

"The results of the new tariff on various goods are seen in the formation of a joint-stock company, with Englishmen at their head, for establishing near Warsaw a branch of the Bromberg Locomotive Works. The company hope to be ready to take orders in the spring. It is also reported from Warsaw that a Bradford house of worsted spinners have purchased a piece of land at Markey, near Warsaw, for starting a mill for the manufacture of these goods. There are rumors also of another mill for Bradford goods being started in Petersburg."

The *Railroad Gazette* of February 23 has information of the laying of five miles of new railroad track, making 168 miles thus far reported for 1883, against 419 miles reported at the corresponding time in 1882, and 173 miles in 1881. The weather thus far this year has not been favorable for track-laying, which has undoubtedly had the effect of lessening—although to what extent cannot of course be estimated—the number of miles completed. It is yet too early to predict with any certainty the prospects, in this respect, of the present year.

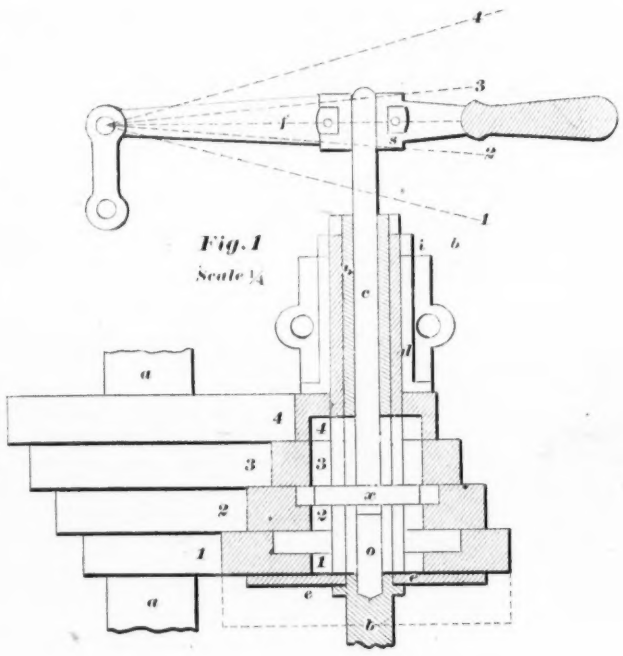
Speed Gears for Lathes.

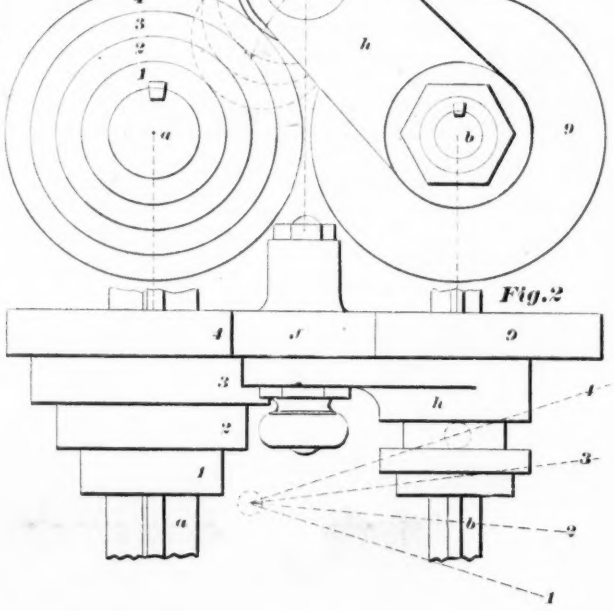
By F. G. Woodward.

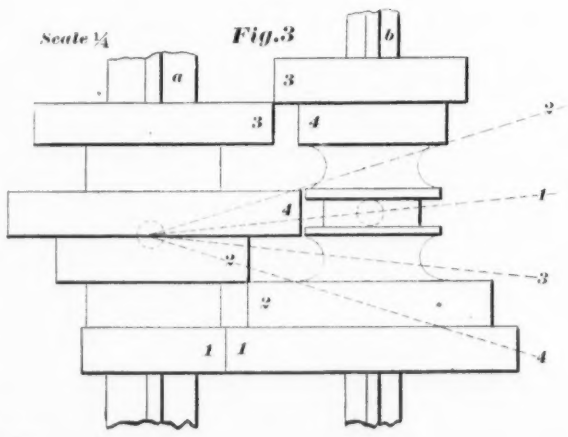
The following delineations represent several methods of arranging gears for the purpose of changing speed: In the system illustrated in the American Machinist of January 27, 1883, the change of speed is effected by the lengthwise motion of the spindle, *b*; but, as it is not always convenient to make the change in this way, the same thing may be accomplished as shown in Fig. 1, in which the driver, *x*, is fixed in the end of the rod, *c*, instead of in the spindle, *b*, a central hole, *o*, being drilled in the spindle for the reception of the rod, as shown. The rod is operated by the usual hand lever and collar, *f*. Fig. 2 shows another four-speed combination by means of six gears. The spindle, *b*, carries a single gear, 9, the hub of which carries an arm, *h*, and the arm in turn carries an intermediate gear, *j*, which works upon a long stud fixed in the arm, as shown. Figs. 3 and 4 represent still another four-speed combination. If the gears are placed as shown in Fig. 3, the machine will need to be at rest when the change of speed is made; but, if the gears are placed as shown in Fig. 4, the change can be made while the machine is in motion.

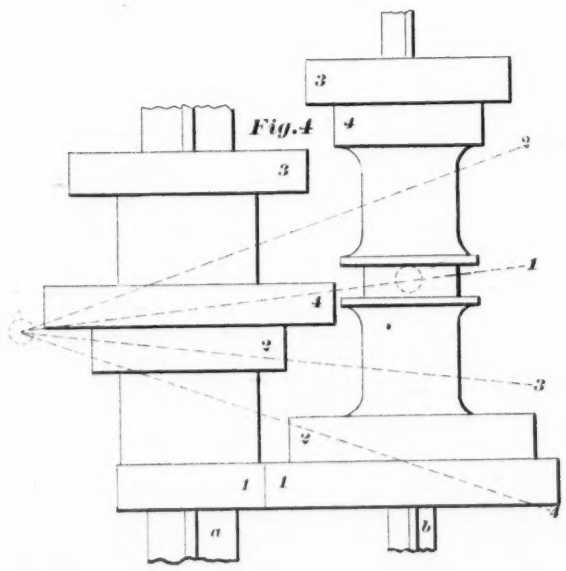
The numerals 1, 2, 3, 4 are arranged to indicate the four combinations by the operation of the hand lever.

The arrangement shown in Figs. 1 and 2 is designed more especially for light work, while the plans shown in Figs. 3 and 4 is best suited to severe labor.









An old engineer of 30 years' experience, says he never has trouble with glass water lines breaking, in fact never had one break except from an accidental blow, or an equivalent cause. He attributes this immunity from breakage to the following treatment of the glasses before use: The glasses are carefully wrapped in some old bagging and introduced into the boiler through the hand hole when cleaning out, and allowed to remain until the hand hole is again removed for cleaning. They are then taken out and laid away until wanted. This he claims tempers the glass so that, in use, there is no danger of breakage from variation of temperature, or other ordinary causes. If this is, as our informant says, a remedy, it is a simple one, and since it costs nothing, is worth a trial.

Locomotive Engine Running.

Accident to a locomotive cylinder by frost—curious pump failures—frost makes injectors popular—don't illuminate steam gauges with angels—losing driving wheels.

By Angus Sinclair.

In the Northwestern regions, where the thermometer has kept about zero for three months, with occasional plunges down to the neighborhood of 30° below, extreme care is needed from those in charge to keep pumps, injectors and pipes from getting damaged by the irresistible expansion which takes place when water freezes. It has generally been understood among those quite experienced in the business of caring for engines outside in cold weather that, so long as a vessel was not perfectly full of water when freezing took place, no damage would result, as the ice would occupy the vacant space. I found this demonstrated to be a mistake the other day. A locomotive got caught in a terrible hurricane of wind and snow—a blizzard, such storms are called in Iowa—and stalled fast in a snow bank. Every effort that skill and experience conceived were made to reach a point of shelter, but without success. While struggling to push through, the water became low in the tank, and so piercing was the wind that the men could not stand out to shovel snow into the tank; and the light, floury-like, unpacked snow of a fresh storm produced a slim return of water for much shoveling. The consequence was, they had to let the engine die. The engineer, a careful man of long experience, used every means within his reach to prevent the engine from being injured by cooling down under these adverse circumstances. He blew the water out of the pump and injector, and broke the joints of the pipes, after blowing the steam through the cylinders, to eject any water that might be lodged therein, or in the steam pipes, and ran the water out of the boiler and emptied the tank. The engine was so badly buried in the snow drift that he could not get down to take out the cylinder cocks, and he got rather badly frozen in trying to do that part of the stripping. When the storm subsided and the engine was examined, it was found that both heads of one cylinder were broken, and the pressure on the back head had been so great that it bent the guide yoke. The cocks on that side had been frozen, and the steam did not pass through the cylinder, but condensed, and remained there in the shape of water. The cylinder was only about half full when the water congealed, yet it caused the damage described.

We had a curious pump failure, which arose, no doubt, from the unusually low temperature. An engineer reached a water station with his tank nearly empty, and filled up. A wave of Manitoba wind was whistling over the prairie, and he put the heater on pretty strong to keep his pump from freezing. When he got the signal to go, he stopped the heater and put on the feed. The instant the water reached the pump the air chamber flew into a thousand pieces. The chamber was cast iron—a material that does not stand sudden changes of temperature very well; but I never before knew of one bursting from the limited change between hot steam and cold water.

Most engineers like to have a pump on their engines, and injectors as exclusive feeding mediums are by no means popular. But this winter has greatly advanced the popularity of injectors. I know a road where 25 per cent. of the pumps have sustained such serious injury from the frost that they have had to be entirely or partly renewed, and, although every one of the engines had injectors, not one of them was in the least damaged by the cold.

Writing of pumps reminds me of a curious failure I once witnessed in a pump. An engine went out after receiving slight repairs in the round-house, and on returning the engineer reported that the pump did not work. The pump was examined, with all its connections, and found in good order. On making another trip it was found that the pump still refused to throw water, and it was so reported when the engine came back. If a pump is all right, and the water gets to it, it must work. That is a physical law which knows no exception. That the water got to the pump I was certain, and that nothing was wrong with the valves or pipes a rigid examination demonstrated. I had forced water through from the hydrant, and it passed quite freely into the boiler, and showed the pipes and packing to be free from leakage. As a sort of last resort, I resolved to have the plunger taken out and examined. When the machinist took off the gland, he found the stuffing-box empty, and no appearance of packing, except a small piece of hemp wound round the plunger close up to the bushing ring. When the pressure of water from the inside was put on, it jammed this packing up to the bushing ring, and prevented leakage, but it did nothing to prevent air from passing through into the pump. All the pump needed was to be properly packed, and when this was done it went to work quite satisfactorily.

A pump failure that was almost as troublesome to locate, once happened to me on the road. I was pulling along with a freight train, when my pump stopped working. There was an injector on the engine, but it was too small to supply water for a full train, so I had to get the pump going. From the feeble stream of water that run from the pet cock, I concluded the trouble to be in the lower valve letting the plunger throw the water back into the feed pipe. I took down the lower chamber, and to my surprise found nothing wrong. The hammer handle pushed on to the upper valve showed that it worked quite freely in the cage. There was no lack of water from the tank. A funny case I reflected as I sprawled in the mud putting the pump together again. On starting out I found the pump went to work all right, but it stopped again before the train had gone two miles, and it acted precisely as it had done before. After cogitating on the matter for a few miles, I made up my mind that sand was the cause of the trouble, although I had detected nothing of the kind about the pump or pipes. The more I thought of it the clearer the case became. Some sand worked up between the valve and cage, keeping the former from falling on the seat, and the jar of taking down the chamber worked it loose so that it threw water for a short time, but had stuck again from the first cause. This was all very clear now. Full of this idea I went down and tapped the cage with a soft hammer, expecting that the jar would loosen the valve, but it did not. I might jar the chamber off and the pump would not pass a drop of water. No recourse but to take it down again. This was done with the same result as in the previous attempt. There was no trace of sand to be found, the valves were all right and the pump went to work when I started out, but again stopped within a few miles. There was something very puzzling about this behavior of the pump, but perseverance would reveal the secret of the trouble. A new idea struck me. I reasoned thuswise. Something passes from the feed-pipe to the lower valve, and failing to go through sticks there and holds the valve away from the seat; and it has fallen back into the air chamber each time I took down the cage. At the next station I took down the chamber and cage again, taking pains to prevent anything from falling from the cage into the air chamber. As I carefully lowered the cage a small piece of iron fell into my hand. There was no more bother with that pump.

I came across a curious steam gauge case the other day which carried frightful potentialities. A fireman with high art aspirations pasted a cupid, which he called an angel, inside the steam gauge glass. To make his angel stick, he used a mucilage of thick gum-arabic. When the heat of the rising steam dried this mucilage, it curled up one leg of the angel like a horn, and when the

pointer of the gauge came round, the leg caught it and held the index fast. Presently a report came round that something was wrong with the "pops" of engine 50, for they went off at 60 pounds. Would I have them screwed down? "No, we will see what the test gauge says first." The gauge was taken to be tested and the angel's leg was found inviting an over-pressure of steam. Angels do not illuminate the insides of our gauge glasses any more.

The solid unyielding condition of the roads has been intensely trying to locomotives and rolling stock generally this season, and has led to numerous failures of engines. A neighboring road in Iowa had a strange accident—a most unparalleled locomotive break down, in fact. The engine, an ordinary eight wheeler, was pulling a passenger train along at no very high speed, when three of the driving wheels flew into fragments. The coupling between engine and tank held and the fire box dropped upon the ground, but slid along some hundred feet till the train stopped. No one was hurt, and the engine sustained very little damage beyond the loss of its wheels.

We had a small Hinkley engine that lost her right back driving wheel while running a passenger train about the same time. The wheel flew off and tore itself clear of the side rod. The break was close to the hub of the wheel, and of course outside the axle box. The engineer took down both side rods, jacked up the broken end of the axle till the box was well up to the frame, jammed blocks between the collar and the pedestal brace to keep the axle up, and then went on without much loss of time. He could keep going ahead all right, but when he attempted to back into a siding the odd wheel was disposed to go into the country. The only change he had to make to get in with the engine was, to put blocking between the frame and the box of the axle that had to carry the greatest share of the additional weight.

Preventing the Roasting of Railroad Passengers.

Railroad accidents in which passengers have been burned to death in ordinary passenger and sleeping cars, or suffocated by gas and smoke, have naturally called public attention to methods of preventing not only accidents (which are mainly caused by carelessness), but the fatal consequences attending smashups of passenger cars having heating stoves in them. Soon after the terrible accident on the Southern Pacific Railroad of California, in January last, our correspondent, Thomas F. Hagerty, of San Francisco, wrote the following communication to the *Examiner* of that city. Its suggestions are worthy of careful attention on the part of railroad managers:

"*To the Editor of the Examiner*—SIR: The recent railroad accident at Tehachapi Pass, where so many valuable lives were lost from the burning of the cars, after the smashup occurred, has prompted me in sending you this communication, with a view to present a remedy whereby some of the terrors of such accidents may be in the future prevented.

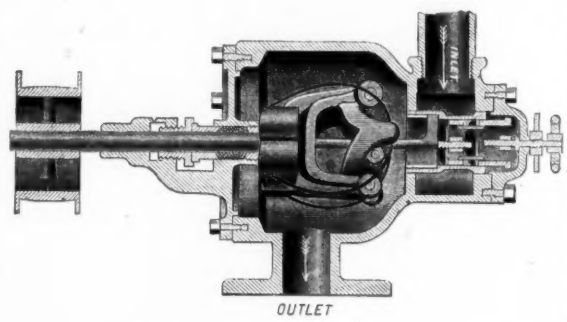
"About one year ago a similar accident occurred in New York, and about four years ago one occurred at Ashtabula, O., all of which resulted in burning the passengers after being crushed and imprisoned beyond the possibility of escape.

"After the New York accident I sought to discover some plan of preventing the stove falling into the body of the car and scattering its burning contents amongst the wreck. All sleeping cars are heated by steam generated through coils of pipe or jackets, which pass through or around the fire in the stove located in one corner of the car, the live steam passing from the pipe to the top of the stove down and through an arrangement of coils located under the seats, and back again to the stove in a condensed state, where it enters the heating coil at the bottom.

"In extremely cold weather an intensely hot fire is required to thoroughly heat the car, as the heat escaping from the stove is not relied upon to aid the steam. The same system of heating the ordinary passenger coaches prevails, except that the stove's heat is permitted to escape through the body of the cars. On nearly all the Eastern roads the old heating stove is abandoned for the steam system.

"In every case where the cars have been burned after the smashup, it has been in the winter time, when the stove is usually red-hot, and in no case which I know of has the fire originated from the breaking of the oil lamps. The upsetting of a lamp has the tendency of extinguishing the flame at the wick; besides, the oil used in those lamps will not take fire by contact with the flame. I therefore attribute the origin of the fire to the scattering of the contents of the stove into the body of the car. About the time of the New York railroad disaster I made drawings and a model of a plan for preventing such accidents, but as the excitement soon died out, the newpapers having ceased to agitate the matter further, I never made my plan public. It is as follows:

"The present construction of sleeping cars, or the ordinary passenger cars, I do not propose to alter, except in the arrangement of the corner where the stove is located. I propose the construction of a sheet-iron compartment three-sixteenths of an inch thick, encircling the stove and lining the bottom, top and sides. The inside wall might be, for simplicity of construction and strength in resisting external pressure, constructed in the form of a quarter circle.



THE LAWRENCE GOVERNOR.

"This compartment should extend from the floor to the roof of the car, and be secured firmly to the frame work. There should be no internal opening except where the steam pipe passes through. The stove should be placed to the iron casing resting against braces, but not attached to the casing. A door should be provided, opening on the outside of the car, through which the stove could be placed in position. This door should be set so as to slide on grooved rollers attached to the top of the door. An aperture should be provided in the casing for the door to slide into when opened, similar in construction to the horse-car doors in use. When the door is shut it would swing out and in at the bottom, but to prevent this an iron strip projects up from the floor on the inside, against which it rests. A thick strip of rubber is placed on the outside at the bottom of the door which prevents its swinging outward. This rubber strip acts in the double capacity of guiding the door, preventing rain or dust from entering, and in case of accidents, should the car fall over on the side where the stove is located, the stove would fall against the door, the rubber spring would yield to the force of the blow, the door would swing outward at the bottom, and the stove fall free from the car long before the car found a lodgment. Should the car fall over on the opposite side the stove would fall in against the casing, where it would be held by the stays placed between the casing and the stove, where none of its fire could escape. In case of collision with another train, or telescoping, where the ends of the cars are smashed, this iron casing (if constructed in the form of a quarter circle), would act as a "buffer," the crash would have the tendency of twisting the entire corner, with its contents, clear out from the body of the car, and the force of the blow endways would slide the door into the casing and knock out the stove. The stove should be attached to the steam pipe at its top and bottom, by means of two "slip couplings," which would occupy too much of your space to describe, and the sheet-iron stove-pipe need not enter over the collar more than half an inch; so that, should the stove be thrown out of perpendicular by an unusual tilt, it would part with its fastenings readily. Inside this fire-proof casement and between the stove and the corner of the car, a coal bin is located. Over this coal bin two iron shelves with sides are placed; on one of the shelves are six steel buckets, and on the other shelf are placed loosely two axes, two steel pinch-bars and two handsaws. These implements would fall out with the stove and be free from the wreck, ready for use. After the stove is once in position the sliding door need not be opened, except to fill the bin with coal; but, for convenience, a small door should be placed opening on the platform, through which the fire could be renewed, and a similar door at the floor of the platform for drawing out the ash-pan or furnishing draft to the stove. This plan of heating has another advantage which appeals to the pockets of the railroad managers; it is this: During the warm summer months no fire is required for at least four months. During all this time the stove, as at present arranged, has to be carried as so much dead freight. By my arrangement the stove can be slid out in a minute and placed in a storehouse, where it would remain until required again in cold weather. This room might be utilized for the storage of ice in summer. I present my plan with a view to lessen the horrors of accidents, not as a preventive. For accidents such as the Tehachapi Pass, there is but one remedy—hold the railroad company's managers responsible for willful murder.

T. F. HAGERTY, M. E.

4 Henrietta Square, San Francisco.

The Lawrence Governor.

We present with this engravings representing in elevation and section a novel form of steam engine governor, just brought out by W. H. Craig & Co., of Lawrence, Mass. This governor is more especially designed for use in moderate sizes, from $\frac{3}{4}$" to $3\frac{1}{2}$ inches, and will be manufactured by the above-named company in connection with the other forms of governors made by them. It is of the class in which the valve is maintained in its proper position with reference to the load, steam pressure and desired speed, by the operation of springs of determined tension to resist the centrifugal action of balls or weights.

The use of bevel gears, or equivalent device, is dispensed with in the construction of this governor, the valve being connected directly and in line with the driving shaft. This shaft passes through a stuffing box and into the interior of the case, in which the working parts of the governor are situated, and in which they are effectually protected from dust or from outside interference. The stuffing box is conveniently arranged for packing, and with the outer and inner bearing forms a long supporting and wearing surface for the shaft.

The valve is of large area, and together with the seat is made of composition steam metal. The valve stem requiring no packing, the valve is free to move without friction to meet the requirements of close regulation.

A "speeder," shown at the extreme right of the engravings, is used for moving the valve in either direction on the stem, by which the revolutions of the engine can be changed at will with the engine in motion, which for many purposes is a very desirable feature.

The springs are simply slipped into place, where they are held by their own tension and without other means of attachment.

As will be seen by the engravings, this governor is of few parts and simple in construction and arrangement. Altogether it presents a neat and novel appearance, and we are informed has stood the severest tests as to its operation. In its manufacture the parts are made interchangeable, so as to be readily duplicated at any time, should it be required.

Lathe Feeds and Mechanical Inquiry.

BY FRANK H. RICHARDS.

The lathe-feed topic will bear a great deal more stirring up. The product of the lathe is of course not determined alone by the feed employed. It may often occur that one using a fine feed will turn out a quicker and better job than one using a coarse feed upon a similar piece of work. We often hear it remarked that no two men will do a job alike. Certainly not. Still there is but one best way, and where men differ in practice there is something that one can learn of the other. It will generally happen, perhaps, that even in such a case the advantage is not all upon one side, and in some particulars each may learn of the other. The actual exchange of ideas is always mutually profitable, but there is plenty of gab perpetrated, which involves no transfer of mental currency. The man who says the most is not the man who has the most to say. A machinist "learning the trade"—and that he always is—finds himself in the position of a young man whom a fond father was sending forth into the world to seek his fortune. "My son," said he, "no one ever embarked in life under more favorable auspices: *you have everything to gain and nothing to lose.*" There is everything to gain by acquiring, nothing to lose by imparting, any knowable thing. I have no trade secrets. I hold nothing that I am not ready to impart to whoever asks it. I do not seek, I will not accept any technical knowledge which I may not be at liberty to exchange as I choose. I would not value money that I might never spend. I have been offered the custody of the most tremendous mechanical discoveries (not the Keely motor) upon the condition of profound secrecy, and I have been compelled to decline the honor.

A latheman to become expert should make a study of feeds and exercise his judgment in the choice of them. He should experiment continually. The study of feeds he would find that he could not pursue as an isolated study. The mere changing of the belt upon his feed cone and watching its effect would be but a very little part of it. He would find if he pushed for that he would have immediately to consider the shape and temper and material of the tool used, the mode in which it was held, its height, pitch and distance to reach to the work, the make and strength of the tool holder and the strength and design of the whole lathe, and its comparative merits and deficiencies as compared with other lathes. Then the material upon which he was operating, the way in which his work was held in the lathe, the mode of driving if upon the centers, would all call for consideration.

The art of learning is the art of asking questions The great mistake in the practice of the art is in the thought that the ques-

tions are to be asked of men. They are the very last instead of the first sources of knowledge. Ask your questions of things, and ask persistently, and if you can't possibly find an answer there then try the best man you know, but don't try very confidently. Some of the most expert workmen I have ever known have learnt the trade—as far as they have got—without asking a half dozen questions of men. Many, if not most things in the trade, are to be learned without shaping a question. When we are ready to ask the question it is already answered. I worked a good many years at the trade before I discovered that a washer with a square hole in it could be turned upon a round mandrel. When the idea did strike me, the time of questioning about it was past. When a fellow has to re-sew a belt and asks me whether it is open or crossed, when I want a screw cut like a given screw and he asks me to tell him the pitch, when he asks me whether a piece of square iron can be centered truly in a three-jawed centering machine, he is not learning, he is only dodging the asking of the real question and betraying himself.

When you see a man who has a wide variety of work persistently using the same feed for everything, you may be sure there is something wrong about him. If a man is utterly without pride in his calling, and of course with it is without ambition or hope of betterment, and just wants to fill his time and draw his wages, he will use the finest feed upon his lathe as persistently as he thinks it safe to; and he will use his finest feed simply because there is no finer, just as the man rode third class upon the railroad because there was no fourth class.

What you eat and how you eat it determines your digestion. What ideas you swallow will determine your mental action. One who has hastily and without examination bolted the pseudo doctrine of the irrepressible conflict between employer and employe is in a bad way. He is the middle-feed man in our shops, and few shops are without him. I would not speak of him with severity, for he is more to be pitied. He is frightened, and has lost his wits. His middle feed is his compromise of what to him is a grave difficulty. He is between two fires, and hopes to dodge them both. His employer must not grumble, and say that he is not doing his best, because it is evident that he could use his finest feed and not do as well. His fellows cannot say that he is rushing things, that he is guilty of the nefarious design of making work scarce, for he still has his coarsest feed in reserve; and so day after day he pursues his way of hopeless and monotonous mediocrity. Oh, I would have to jump up and down and tear around, and smash things, to stir my vital fluids occasionally.

I tried a little experiment on one of these middle-feed men the other day. He has gone now, poor fellow. We have a lathe which has a small cone—three steps—geared to the feed rod, which runs along the front of the lathe. The cone had a gear of thirty teeth and the rod one of forty-five teeth, and I found that they were by design interchangeable, and I thought the idea a good one, as giving a desirable change of feed for some special kinds of work without cost to anybody. I changed these gears, thereby more than doubling the feed of his lathe, and my middle-feed man went right along just the same as ever, perfectly safe and satisfied with his middle feed. The experiment showed me, what I knew very well before, how much the requirements of his had to do with the feed that he used.

I don't know what kind of a bargain is tacitly made when a man is hired to run a lathe. He generally talks beforehand as if he meant to get all that he could out of it. If a man wants to get along in the world, and doesn't do his best, he is a fool. The proprietor of a shop has an indisputable right to dictate how his tools shall be operated. But dictating feeds is too much like quarreling with the cook. The cook has the game in his own hands, and has too many opportunities of revenge. The cultivation of a healthy emulation and hearty *esprit de corps* is better than too frequent specific criticisms.

I think I know that usually our lathes do not have a sufficient range of feed. I find myself wanting both finer and coarser feeds than we have. For instance, if I were boring a piece in the chuck, or turning something very irregular on the outside, and required to carry a deep cut to keep under the scale, I would use as fine a feed as might be necessary to hold it. In doing heavy work in the chuck, a man is very often troubled by its chattering. Nothing is more uncomfortable than to have a cut which just lifts the weight of the spindle and its load. Chattering from this cause may be cured by taking a much heavier cut, as well as by carrying a lighter one.

By the way, not to bore any more at present, I think that chattering tools have bothered me more than any other one thing in the shop. Have not some of the experienced correspondents of the American Machinist something to offer on the subject?

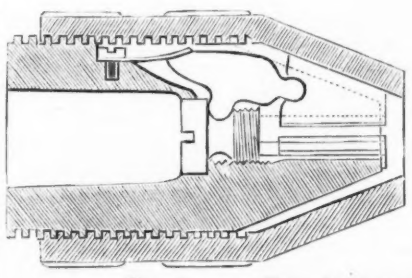


Fig. 2. The American Drill Chuck. Fig. 1.

The American Drill Chuck.

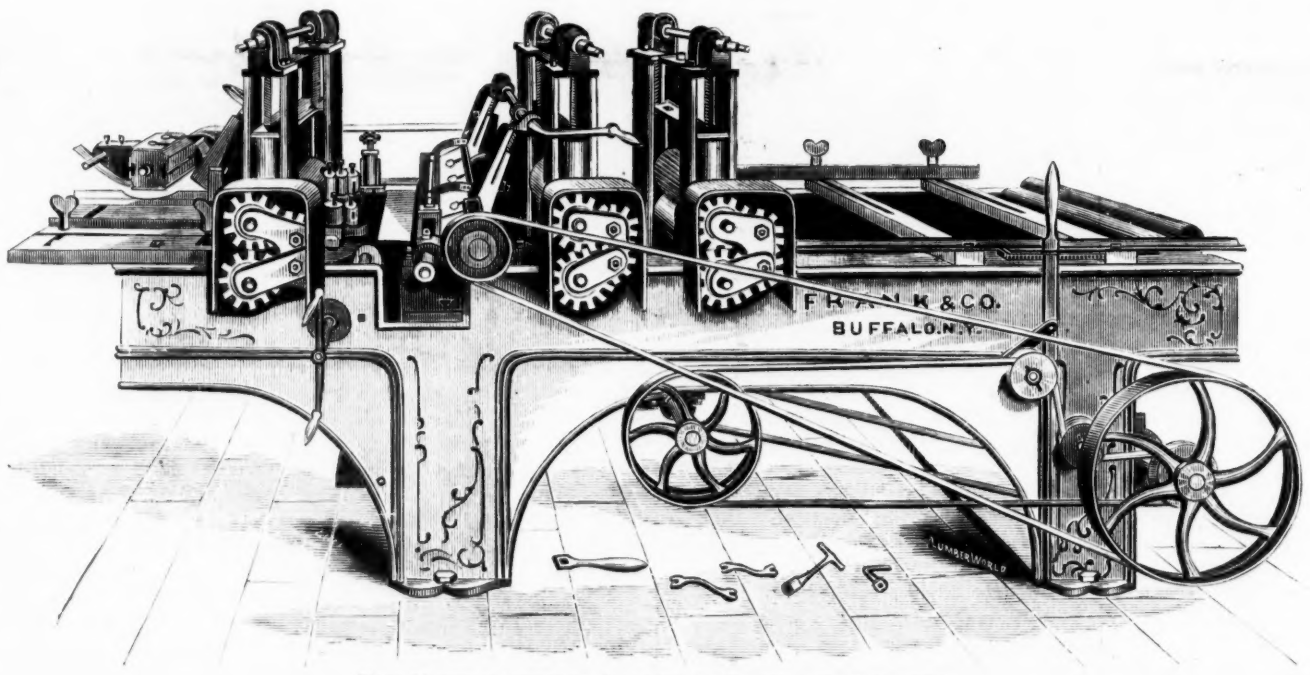
We present with this engravings representing a new drill chuck for machinists and jewelers, made by Brehmer Brothers, 440 North Twelfth street, Philadelphia, Pa. Fig. 1 shows an outside view of the chuck, and Fig. 2 a horizontal section. The central body is provided with a square thread on its outer surface, and is adapted to fit on the outer end of the lathe center. The outer shell is correspondingly internally threaded, and by being screwed on or off, the central part of the chuck adjusts the jaws towards or away from the drill shank. In closing the jaws on the drill the inclined surface of the shell presses upon the similarly incline of the jaws, forcing them inwardly. The jaws are linked to the body of the chuck by flat links, one of which is shown in the sectional engraving, and remain at all times parallel. Upon unscrewing the shell to release the drill, the spring shown bearing upon the end of the link operates in a manner clearly indicated to hold the jaws apart and in contact with the outer shell.

The chuck is simple in construction and should be manufactured cheaply. The jaws are, in fact, of such a simple form, being made of a flat piece of steel without any projections or incisions on the sides, that in case of an emergency, any machinist can replace them by the use of no tool beyond a drill and a flat file.

Double Surface Planer, Matcher and Moulder.

The accompanying engraving represents the new 24-inch double surface planing, matching and moulding machine, manufactured by Frank & Co., 176 Terrace street, Buffalo, N. Y. There are some features peculiar to this machine, especially the arrangement of the under cutter head, which is placed forward from the upper cylinder, and centrally under the wide pressure bar. This pressure bar acts as the upper plate to hold the lumber, in planing firmly to the lower cylinder. The bar is always in adjustment with the upper cylinder, being attached to the bearings of, and raised and lowered with, the former. From this it will be seen that the pressure bar requires no adjustment to the lower cylinder in changing to plane different thicknesses, the operation of adjusting the upper cylinder being all that is required to bring the bar into proper position.

The position of the pressure bar with relation to the upper cylinder is always such that it is impossible for shavings to get under; hence no scraper is required. The under cylinder is set in an independent frame, so that by loosening a thumb-nut it can be drawn out at one side a sufficient distance to remove, sharpen and set the cutters.



New Double Surface Planer, Matcher and Moulder.

The planer has six solid feed-rollers, which are connected by expansion gears. These will expand 6″, or the full thickness the planer will surface. The connections for expansion and intermediate gears are brass bushed.

The moulding attachment is situated forward of the feed rolls, and is capable of adjustment independently of any other parts. The head can be adjusted vertically or laterally, and the entire attachment can be removed by unscrewing one bolt. All ordinary mouldings can be worked on four sides at once.

To change this machine from a planer and matcher to a surfacer, it is only necessary to remove the matcher-heads, the spindles being below the bed of the planer. As a planer it will plane 22″ wide, or by removing one guide 24″ wide. The tight and loose pulleys are 10″ in diameter, with 6″ face, and can be run from 900 to 1,000 revolutions per minute.

LETTERS FROM PRACTICAL MEN.

Engine Lathe Construction—Planing the Bed.

Editor American Machinist:

If I were buying or building a 20-inch engine lathe, I don't think I should buy or build one with a 7-inch spindle. By the way, I wish your correspondent who favors a spindle of that size would let it be known by what process he arrived at his knowledge of the requirements; in other words, how does he know that seven inches is not too small, or that it is not a good deal too large? It is one thing to say make it seven inches, and another thing to say why it should be made seven inches. I believe in a strong, but don't want a clumsy, lathe.

If I make a lathe with a seven-inch spindle, I must turn the end down for a chuck, or I must persuade the chuck-makers to overturn their entire system.

I believe one of the greatest difficulties with engine lathes is originated on the planer. When you plane a lathe-bed winding, there is no reasonable probability of ever getting the wind out of it.

My plan of planing a lathe bed may not be the quickest, but I can vouch for its accuracy. I clean off the under side at each end, and under one end, and in the center crosswise (between the bed and the planer platen), I place one piece—a nut is as good as anything—and at the other end, and near the corners, I place two nuts. This rests the bed on three points, and, of course, out of wind Then smooth off the edges, chalk them, and with the surface gauge mark fine lines. In removing the nuts, and blocking and strapping for planing, be governed entirely by these lines. The last cut should be taken at a coarse feed, just previous to which the clamps should be loosened, and a careful examination made by the lines to determine if the blocking does not need readjusting. In blocking under the center of the bed, equal care should be taken to avoid springing. I believe if this plan of planing beds is followed, less fault will be found with this part of the job, and there will be less talk of the utility of mounting it on three legs.

By the way, why not make the inside of the lathe ∧'s lower than the outside ones, and so provide for getting the carriage low, without weakening it by cutting into it? I ask this question in hopes of an answer.

Crank Pin.

Engine Lathe Criticism.

Editor American Machinist:

In your issue of the 20th ult. "Veteran" writes some machine tool notes. He says: "If Mr. Shanks' 24" center marine shafting lathe weighs 100 tons, &c." The large *crank* shaft lathe we make, weighing 100 tons, is 60 inch centers, double beds, 10 feet across. Our 24" shafting lathe, for plain shaft, with end couplings, and in which we turned the 28" diameter cast-iron roller 18½ feet long, in 2½ hours, weighs some 20 tons. We took only one cut over, but with a front and back-cutting tool. The head is made in the usual way, with a tail pin to take the strain of thrust on centers.

On the subject of lathes, I have read your article, by Mr. J. E. McConnell, on "Unequal Changes of Lathe Speeds," and his examples bear out what is very common in Britain; that is, manufacturers supply a tool that, if analyzed, comes very far short of perfection. Lathes are exceptional in this: every different diameter alters the area of the surface machined.

Take, for instance, the second example Mr. McConnell gives; and, while we have a lathe with eight different speeds, at least three of them are utterly useless for any work the lathe will ever be called upon to do. There remains, therefore, the following speeds available: 4.16, 6 02, 8.61, 12.47, and 46.20. At a constant speed of 15 feet of cutting per minute, we find that we have correct speeds for turning, say, 15" diameter, 10" diameter, 7½" diameter, 5" diameter, and 1¼" diameter. All intermediate diameters must be done at the nearest possible, but not correct, cutting speed.

Some of your readers may say, "But what do you do when you wish to polish?" Well, turn off a tool finish correctly, and you have a better result.

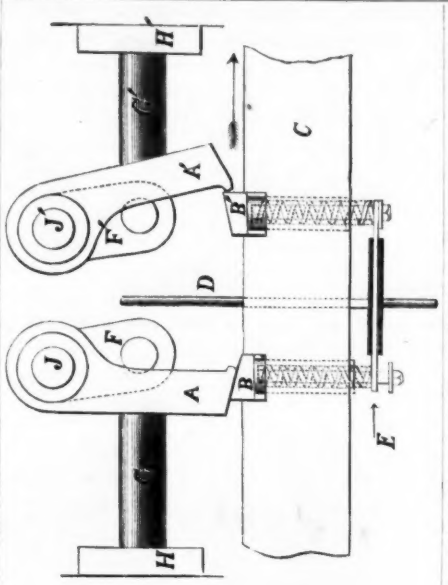
In treble-geared lathes the step is sometimes greater than in those with double gear, but this may in a great measure be overcome by introducing an equalizing pair of wheels between the double and treble gears.

This question opens up a large field for study, as with these changes of cutting speed we have a change also of belt velocity, and that always to the disadvantage of the lathe in doing heavy work.

Should this subject prove interesting to your readers, I will be glad to send you a further communication on what I consider the correct system of lathe construction, as illustrated by the photographs I sent you, showing change wheel driving gear.

WILLIAM SHANKS

Thos. Shanks & Co., Johnstone, near Glasgow, Scotland.



Jack-at-all-trades to get much in the way of wages)? If a machinist understands his business, as he ought to do, he hasn't had any spare time to learn other trades, and has no reason to leave his trade to work at some other. Moreover, a good machinist won't be converted to a poor carpenter or wheelwright. EQUILIBRIUM.

Raising Planer Heads.

Editor American Machinist:

The common practice in raising a planer head up to clear a piece of work to be planed is to get on a box, crank up the head awhile, and then get down and squint and measure, repeating the operations perhaps three or four times.

I find it saves lots of time to have the clear height of the head figured on the side next the raising handle, then it is only necessary to measure the height of the work, raise the head to the corresponding figures and go ahead. This not only saves time, but occasionally it saves running the work against the planer head.

By the way, would it not be a good plan for manufacturers to graduate the height of the head, say by half inches, and so save the user both time and trouble? PLANIST.

Removal of Particles from the Eye.

Editor American Machinist:

One of the most valuable "Shop Kinks" I ever stumbled on should be of interest and use to your readers. For removing steel chips or emery from the eyeball, take a wooden toothpick or small wire, and wind the end with a shred of lamp wicking, or cotton, or wool fiber. This forms a small pad, which, under the microscope, shows a snarl and tangle of threads, which will catch on to almost anything.

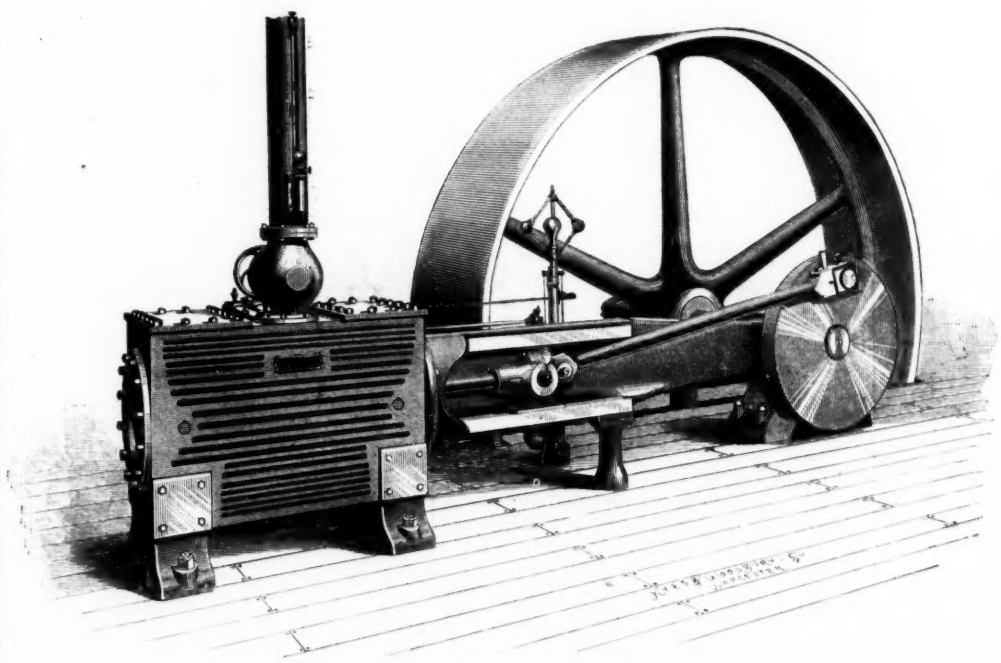
If there is any projecting point, or the foreign substance be not completely embedded in the eye, a gentle, sweeping touch with this pad will take it out instantly and painlessly; and the beauty of it is that no harm can be done if the eye flinches or rolls, and a false stroke is made. The old use of the knife is always dangerous, even in a steady hand, and should be avoided, except in cases of thoroughly embedded particles, which make its use absolutely necessary.

It cost me five minutes, one dollar, and a sensation of immense relief to learn the above, and has been worth lots of comfort since. EDWARD O. CHASE.

Newark, N. J.

"USEFUL HINTS ON STEAM."—In a previous issue we noticed the pamphlet bearing this title, and advised our readers to send a 2-cent stamp for it. Mr. Roberts informs us that the result surprised him as to the extent of our circulation, as he has received several thousand applications for the book in reply to the notice.

We should have said that the book is only free on *personal* application, but will be mailed for *fifteen cents* in stamps. It is in no manner a circular or price-list, being an advertisement only indirectly. In noticing it at first, we obtained our particulars only from the book itself.



THE IMPROVED GREENE AUTOMATIC ENGINE.

The Improved Greene Automatic Engine.

We present with this engravings representing, in two views, the improved "Greene" automatic cut-off engine, manufactured by the Providence Steam Engine Company, Providence, R. I.; also a diagram representing the mechanism that operates the steam valves.

The bed-plate of this engine is of the girder type, the general construction of which can be seen from the engravings. The guides instead of being cast solid with, are made separate and bolted and doweled to, the bed-plate.

The cross-head gibs are located centrally with the pin, thus avoiding any cross strain upon the piston rod.

Four valves are employed in this engine, which are all flat slides, controlling the admission and eduction through ports of large area. They are moved by the application of force in a line with their seats, thus obviating a tendency to wear unevenly. The steam valves are operated by toes *A*, *A'*, on the end of two rock shafts that connect with the valve stems *G*, *G'*, outside the chest *H*, *H'*. The sliding bar *C*, receives a reciprocating motion by means of an eccentric, and is provided with tappets, *B*, *B'*, supported by springs, resting on the gauge plate *E*. As this sliding bar is moved (in the direction of the arrow in the diagram) one of the tappets is brought in contact with the inner face of the toe, thereby opening the corresponding admission valve, while the other tappet passes under the opposite toe without moving it, the beveled surfaces operating to compress the spring and force the tappet down until it has passed the toe, when the spring instantly returns it to its proper position for opening the opposite steam valve on the return stroke.

It will be understood that, the toe describing the arc of a circle while the tappet moves in a straight line, the former will be liberated by the latter at a time in the motion of the bar corresponding with the height of the tappet from the bar. This height is controlled by the operation of the governor, which is attached to the gauge bar, through the rod *D*, in such a way as to raise or lower it, and with it the tappets, thus determining automatically the proper point of cut-off to correspond with the load, steam pressure, and the desired speed, the range through which the cut-off is operative for this purpose being from zero to three-quarters stroke. When the tappet and the toe pass from contact the steam valve is instantly closed by the operation of the steam pressure against an area represented by the diameter of the valve stem, supplemented by suitably attached weights. By the operation of this mechanism the lead of the valves is at all times constant, while the point of cut-off is always under direct control of the governor.

The governor is of the Porter pattern, driven by a belt from the main shaft. It is provided with a stop motion, so that in the event of the breaking or running off of the belt the engine will be stopped.

The exhaust valves receive motion from a separate eccentric, thus providing for independent adjustment of steam and exhaust valves. The valve connections are all outside, where they can be readily come at for inspection and adjustment, and where they are not subject to the corrosive action of the steam. It will be seen that this engine is simple in construction, the parts of the valve gear being neither numerous nor complicated. The other parts of the engine are of solid construction, with good facilities for adjustment for wear of the several parts.

The company also have an office for the sale of these engines at 22 and 24 North Fourth Street, Philadelphia, Pa., which is in charge of A. L. Dunton, agent and manager.

The Machinist as a Carpenter and Wheelwright.

Editor American Machinist:

The following advertisement recently appeared in one of the city papers:

"Wanted a first class machinist, competent to do the wheelwright and carpenter work of a factory * * * *"

This seems to go a good ways in showing what many people include under the word machinist. Why should it be expected that a machinist will go and pitch into some trade that he knows nothing about, probably for a small compensation (no one ever knew a

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EDITORIAL ANNOUNCEMENTS.

☞ *Positively we will neither publish anything in our reading columns for pay or in consideration of advertising patronage. Those who wish to recommend their wares to our readers can do so as fully as they choose in our advertising columns, but our editorial opinions are not for sale. We give no premiums to secure either subscribers or advertisers.*

☞ *Every correspondent, in order to insure attention should give his full name and address, not for publication, but as a guarantee of good faith.*

☞ *We are not engaged in procuring patent rights, or in selling machinery; nor have we any pet scheme to advance, or hobby to ride.*

☞ *We invite correspondence from practical machinists, engineers, inventors, draughtsmen, and all those especially interested in the occupations we represent, on subjects pertaining to machinery.*

☞ *Subscribers can have the mailing address of their paper changed as often as they desire. Send both old and new addresses. Those who fail to receive their papers promptly will please notify us at once.*

NEW YORK, MARCH 17, 1883.

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American Machinery for Russia.

Wherever, in foreign countries, American machinery, either for iron working or wood working, has been sold and used, its superiority has been acknowledged. In most European countries, however, some prejudice exists in favor of English or German machinery, as being most generally used and known, and frequently as being lower priced. In no other country where American machinery has been introduced, only to a very limited extent, does this prejudice exist in a less degree than in Russia. The general disposition of the people of that great Empire, which is now presenting evidence of rapid and substantial industrial progress, is to favor anything American, especially any class of mechanical productions needed in the development of their manufacturing establishments. It is not a work of great difficulty to convince them that certain kinds of machinery made in this country are cheaper to buy because of greater capacity and ease of operation than English machinery of like kind at lower prices. The demonstration, however, must take place in Russia where the machinery is wanted, as manufacturers in that country doubtless have no more leisure to make journeys to localities thousands of miles distant, to study the operation of machinery, than have manufacturers in the United States. While our machinery manufacturers had about all they could do to supply home trade (for a time, more than they could do), the establishment of a foreign trade was not regarded with much concern. But since the volume of home trade has contracted perceptibly, and may contract still more before it again expands, a foreign demand becomes an object worth seeking, and Russia seems to present about the most promising field for its development.

Heretofore but little special effort has been made to sell American machinery (other than wood working) in Europe.

The putting forth of an average degree of characteristic enterprise by our manufacturers of iron working, wood working and textile machinery to secure Russian trade, will, we believe, be productive of satisfactory results. Consul E. G. Van Riper, at Moscow, who has been spending several weeks in New York city, making earnest efforts to open the way for a larger demand for American productions from Russia, has written us the following letter in regard to cotton machinery, which we commend to the consideration of the manufacturers of that specialty throughout the Union:

Publishers American Machinist:

My Dear Sirs:—Thanking you for your courtesy in aiding me in my efforts to introduce American cotton machinery into Russia, which I hope may be productive of satisfactory results, I beg once more to call your good attention, and through you that of the manufacturers of cotton machinery in this country, to the importance of this comparatively new field for the sale of their improved machinery, which is acknowledged to be the best in the world.

In Russia, with a population of nearly 100,000,000 souls, the manufacture of cotton goods is in its infancy. Even with the protection of an almost prohibitory tariff, the number of spindles in use at the present time comprises but 3½ per cent. of the total number in use in the world, as against 24 per cent. for the United States, and 60 per cent. for Great Britain. It is only necessary to state this fact, to show the extent of the field which will, sooner or later, be filled. The spinners are making money rapidly, and constantly adding new machinery and erecting new mills, supplied up to this time entirely by English manufacturers, a condition of things which arises almost, if not entirely through ignorance of the improvements in machines in use in this country.

After a residence of ten years in Russia, and having an intimate acquaintance and relation with the cotton business there, it has always been a wonder to me that our active and enterprising American machinists have not at least made an effort to introduce their productions in that country. It is with this view that I venture to address you these lines, with the hope and belief that you will use your best efforts to bring about such a result.

To any and all who wish information from there on this subject, it will give me great pleasure to furnish any information desired, and if they will send catalogues and general particulars concerning same to me at Moscow, I promise them prompt attention, and believe a satisfactory business will result therefrom.

I have the honor to remain, your obedient servant,

E. G. VanRiper,
U. S. Consul, at Moscow, Russia.

New York, Feb. 23, 1883.

As Moscow is the commercial metropolis of Russia (with a population about equal to Philadelphia), and the U. S. Consul, with commendable enterprise and energy, is actively assisting any American manufacturers who are willing to make the necessary efforts to introduce their productions into that country with a view to establishing a profitable trade, we suggest to our machinery manufacturers that the opportunity is one they should not let pass. It is well not to wait until orders become slack before making the venture. Freights to Moscow are comparatively light—not enough more there from England to make any drawback to trade in machinery. As a rule, responsibility of purchasers is good, and risks of losses small. We shall take up this subject again, and will dismiss it now by adding that Consul Van Riper will have started on his return to Moscow before this reaches our readers.

Creating Skill.

A few years ago the fact was generally recognized that skilled workmen only become such through necessary years of hard work and persistent effort, just as the physician fits himself to practice medicine or the lawyer to practice law. The idea seems to be at the present time, to a considerable extent, that this view of the case is an erroneous one, and that the necessary skill can in some way be imparted in a few days or hours quite as well and to a much better purpose than it can be acquired by some years of experience. As an evidence of just how well this new plan works, we copy from the *New York Times*, of a recent date, the following suggestive account of one of these modern attempts to *create* skill. Perhaps those who made this attempt, as well as others who are occasionally making similar far-seeing efforts in the same directions, may in time learn that they can just as easily create their products already finished as create the skill required to finish them. Whether they do or not, they have the satisfaction of paying for their education.

"The long-expected start in the rail mill of the Vulcan Steel Works was of short duration, in spite of the repeated and earnest efforts of the bosses and new hands engaged in the work. The prediction of the union men that the attempt to make rails with green and inexperienced men would be a labor of difficulty was fully verified to-day. Rail-making is the most difficult work in the steel mills, as it requires not only accuracy, but great dexterity, in handling the blooms as they are passed through and from the rollers, while in the process of being made. The failure was not unexpected, even by those most interested in the success of the experiment; but as the company has determined to go ahead, prepared to overcome all difficulties no matter what the cost may be, the work will be tried until satisfactory results are obtained. Three successive trials were made to-day, each of which was a decided failure. The novices, notwithstanding the drill through which they had gone for several days previous, displayed almost utter ignorance of the work, and performed it in a bungling manner. The first three rails turned out were "cobbled," and the next run was equally as bad. One of the men, in trying to throw a red-hot rail on the hook, missed his aim and struck the hook, sending it flying toward the roof. Another man, acting as rail-catcher, not being quick enough, came near being drawn into the rollers. Other mishaps occurred, but fortunately none of the men were injured. So slow was the work that it was necessary on several occasions to send back to the heaters blooms that had become chilled."

Further comment on this sagacious attempt to discount skilled labor would be quite superfluous. We have, however, received a communication from a young man enclosing an extract from the Worcester *Spy*, and asking our opinion upon it. The extract, which seems to deserve notice, is as follows:

"If sufficient inducement is offered, a company will be organized in this city about May 1st, to give practical instruction to young men who desire to learn the machinist trade. The idea is to give in six or eight months as much practical instruction in the trade as an apprentice ordinarily receives in three years. Instead of being helpers, and kept on coarse, heavy work, they will be shown the tool making and general repairing branch of the trade, lathe and planer work, gear cutting, mechanical drawing, and hand scraping, the latter something that only skilled workmen can do. The gentlemen who have the matter in hand are skilled machinists, and propose to build lathes, planers, drills, and steam engines."

Whatever the intention of the above may be, it unmistakably conveys the impression that by virtue of superior advantages, this about-to-be-organized company can graduate a young man machinist in six or eight months' time. Young men—intelligent ones—in our best machine shops, learn but a small part of the trade in three years—the common period of apprenticeship in this country. To suppose that the same young men would in the employ of this projected company be able to learn as much in a few months, is simply ridiculous. The idea conveyed seems to be that the man is to have the trade learned to him instead of learning it himself; the biggest kind of an impossibility.

The notion that it will be an advantage to a young man to get rid of intimacy with the more common work of the machine shop, the "coarse, heavy work," is a mistaken one. It is only by learning to do such work that he will acquire the necessary skill to *begin* to learn to do finer work. Even if it were possible for him to learn to do the finest jobs without the knowledge of that part of the trade that is learned by contact with many other, perhaps homelier, things, he would simply be a specialist, and in no sense a machinist.

We have no intention in any way to prejudice the efforts of this new company, but in the interest of our correspondent who inquires, as well as of others who may be interested, we must say that it is not wise to believe that the machinists' trade can be learned in six months or a year, and that learning to do one piece of work in a machine shop is not learning the trade. The consideration to be looked for in an enterprise of this kind is plainly, to the young man, one of dollars and cents, and not the acquiring of such knowledge of the machinists' trade as shall put him on a level with the skilled machinist.

Take a job of this kind by all means, if, so far as gaining a livelihood it seems the best thing to do, but don't believe yourself to be enough of a genius to learn to do anything of much importance in a machine shop, very well in six or eight months, and particularly don't believe that all the instructors in the world can "learn" you to do anything.

Power and Profits of Prison Contracts.

The question of putting an end to the odious prison contract system, whereby honest, free labor is obliged to compete with penal labor jobbed out by the State at ridiculously low prices to a few favored individuals, is one that will not cease to give trouble until it is fully settled. No half-way measures, such as limiting the number of convicts employed in any one industry, will suffice. The evil is one that has long existed, and can only grow worse the longer it is tolerated.

Sixteen years ago, in a report made to the New York State Legislature on prison reform, by Prof. Theodore W. Dwight, of Columbia College, and Dr. E. C. Wines, an important fact was stated in the following language:

"In New York State the contract system is the fruitful and most mischievous source of discontent and insubordination in the convicts, favoritism and oppression by the officers, weakness and laxity in the discipline, and corruption in various forms. It entails most serious pecuniary losses upon the State, and makes the prisons a seminary of vice rather than a school of reform."

According to concurrent evidence presented to the Legislative Committee now at work upon the same matter, the same conditions now exist in the prisons of New York State, and like results are being experienced. Why, then, have these glaring evils been endured so long? The answer is not so difficult as might be supposed when we come to inquire into the money value of the contract

system to the few participating in its nefarious profits. Take a single example: Perry & Co. have a contract for the labor of 900 Sing Sing convicts for five years, at 56 cents a day each, in the manufacture of stoves. These convicts are worked to their full capacity under penalty of the paddle, starvation diet, or other severe punishment. Every man is compelled to do a man's work. It is reasonable to estimate an average moulder's wages at $2.30 to $2.50 a day, and when free shop rent is thrown in (as it is in the prisons), $2.56 is not too large average wages and rent for each workman. This would give Perry & Co. a bonus of $2 a day for each man, where an outside stove manufacturer could not expect to obtain anything.

Eighteen hundred dollars a day for three hundred working days, in one year, amounts to the snug little sum of $540,000. For five years, the term of the contract, it amounts to $2,700,000 (*two million seven hundred thousand dollars*). But even this does not properly come under the head of *profit* (although a clear gain); it is merely a bonus, as compared with unsubsidized stove manufacturing establishments, a simple margin which, protected by law, the contractor is kindly permitted to pocket before legitimate manufacturing profits are touched. "But," says some reader of labored magazine articles on the public benefits of prison contracts, "does not the State receive a benefit?" Oh, yes; we will not forget that. While the contractor pockets a *clear bonus* of two million seven hundred thousand dollars (on the basis of free moulder's wages), another application of common school arithmetic shows that he pays the State seven hundred and thirty six thousand dollars for the privilege of doing so, the State meanwhile paying out of that sum (as far as it will go), for the food, clothing and maintenance of the 900 prisoners and the expenses of workshops. But this is but one contract in one prison, of one State, and the rate, 56 cents a day, is higher than the average prison contract price. In the State of New York there are three prisons and quite a number of penitentiaries, and "reformatory" institutions where contracts of the same liberal nature (not to the people but to the contractors), are in force in several branches of industry. Is it any wonder that the contract system is supported with so much tenacity? A small percentage of the enormous gains of contractors placed "where it will do the most good," must exert some perceptible influence. The tens of millions of dollars involved in sustaining the detestable prison contract system in this country so far overreach the whole amount voted by Congress last year to improve rivers and harbors, about which much public indignation was felt, that this "steal," as it was characterized by the daily press, sinks in comparison, almost into insignificance. Every dollar of illegitimate prison contract profits is filched from the pockets of the people while the people who own the prisons are forced into unwarranted competition with the labor of their imprisoned criminals.

Mechanics and manufacturers are determined that the prison contract system shall be abolished, but it will not be relinquished without a hard struggle.

QUESTIONS & ANSWERS.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

(100) H. K., Cambridgeport, Mass., asks: What power will be required to propel a flat bottomed boat 10×30 feet, 6 miles an hour? *A.*—From 10 to 12 horse power, we should suppose.

(101) H. G., London, Ontario, asks: What dimensions of steam and exhaust ports would be suitable for a 16″×24″ cylinder; also what should be the lap and lead of valve, plain slide? *A.*—We should say you would get good results with steam ports 1¼″×15″, exhaust port 2⅛×15″, outside lap of valve 1″, inside lap ¼″, travel of valve 4⅛″.

(102) Doubt, Port Henry, N. Y., sends sketch of a piston valve, and asks: 1. Is this a balanced valve? *A.*—The sketch does not show whether the ports extend entirely around the seat, or only on the part next the cylinder. If they extend entirely around the seat we should say it would be balanced; if not we should say it would be unbalanced. 2. At what speed should a 10″×12″ engine be run to get best economic results? *A.*—This will depend entirely upon the construction of the engine.

(103) J. M., Washington, Ohio, asks: 1. How would a cupola of the dimensions given in your issue of Jan. 24, answer to melt three or four thousand pounds of iron per hour, using a No. 6 Sturtevant blower? *A.*—We should say it would answer well. 2. How are the joints in air box made so as to be tight, but at the same time elastic? *A.*—But little elasticity is required, which is obtained by using lead gaskets. You will find all your other questions answered in the article referred to, or by the drawings.

(104) A. V., Joplin, Mo., asks: Can you give me any information about tempering mill picks? *A.*—Various methods are employed in tempering mill picks. Some smiths heat the end to be tempered in lead at boiling temperature, and cool in clear water. Others use, it is claimed very successfully, a bath of two gallons rain water, 1 ounce corrosive sublimate, 1 ounce sal-ammoniac, 1 ounce saltpetre, and 1½ pints of rock salt. The picks are heated to a cherry red, and cooled in the bath without drawing the temper.

(105) J. B., Cleveland, Ohio, writes: In your issue of Jan. 13, 1883, you say in answer to W. H., who inquires about freezing of air in exhaust pipes: "The freezing is only what could be expected." Why? *A.*—In compressing the air it is heated, and since the volume exhausted is the same as before compression, its temperature will be reduced to the extent of the heat lost by radiation, transformed into work, &c., so that under the circumstances mentioned by our correspondent it might be expected that the temperature would be below freezing.

(106) J. B. Bell, Perryville, Mo., asks: Will you tell me the cause of the following accident to our engine: The engine had been stopped a week in very cold weather with the cylinder cocks open and cylinder thoroughly drained. Upon starting up the cylinder was slowly warmed, and on turning the back center a jar was felt and the engine stopped. Upon removing the cylinder head it was found that two follower bolts were broken where they entered the spider, allowing the lower half of the piston to strike the head. The cylinder is 14″×24″? *A.*—With the view of the case we get from your letter we should be inclined to believe that the inside of the piston was full or partly full of water, which in freezing expanded and broke the follower bolts.

(107) E. F., Philadelphia, Pa., asks: 1. Please give me a rule for finding the diameter of shafts to transmit a given horse power? *A.*—Wm. Sellers & Co., in their book on "Machine Tools" give a formula that has the merit of being, we believe, entirely safe. Their formula reduced to a rule may be stated as follows: Divide the horse power by the number of revolutions per minute, and multiply the quotient by 125. The cube root of the product will be the diameter of shaft required. Example: What should be the horse power of a shaft to transmit 100 horse power at 200 revolutions per minute? 100 divided by 200 and multiplied by 125 equals 62½, the cube root of which is about 4 inches. 2. Give me a rule for the proper distance apart of journals, and the position of couplings, on line shaft? *A.*—There is no rule for this. It is customary to have journals 8 to 9½ feet apart, and the couplings near the journals.

BUSINESS SPECIALS.

Transient Advertisements, 50 cts. a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

Steel Name Stamps, &c. J. B. Roney, Lynn, Mass.

Portable Forges, $10. Holt M'f'g Co., Cleveland, O.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N.J

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Acton's Improved Bogardus Mills, warranted. Room 14, R.R. Depot, Franklin & Center Sts., N. Y.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Wood Engraving done in best manner. Designs furnished. Edward Sears, 48 Beekman St. New York

Foot Power Machinery, for workshop use, sent on trial if desired. W.F. & John Barnes, Rockford, Ill.

Pattern and Brand Letters. Vanderburgh, Wells & Co., corner Fulton and Dutch streets, New York.

For sale, 25″ lathes of best designs from new patterns. George A. Ohl & Co., E. Newark, N. J.

Chas. T. Porter, Mechanical Engineer, Tribune Building, (Room 42,) New York City.

Universal grinders for lathe-centers, chucks, angles or cylinders. C.C. Hill, room 8, Uhlich Block, Chicago

Pond planer, planes 5′x24″x24″, to be replaced by 8′ same make, now in use and for sale by Am. Twist Drill Co., Meredith, N. H.

For a strictly first-class automatic engine of from ten to sixty horse-power, address, The Straight Line Engine Co., Syracuse, N. Y.

Steel Forgings, either plain or crank, up to 10,000 lbs. in weight. Address, Pennsylvania Steel Co., 160 Broadway, New York.

Pattern Maker's Assistant. By Joshua Rose. 324 pages, $2.50 by mail, postpaid. Address orders, P. O. box 3,306, New York City.

Lyman's Use of the Steam Engine Indicator; an account illustrated by diagrams of some of the practical work of the author. Price, $1.00. E. Lyman, C. E., New Haven, Conn.

A handsome monthly journal sent free to engineers and mechanics. Enclose four 3-cent stamps for year's postage and receive paper. Money Saver, 95 Liberty street, N. Y.

Boring Bars made all sizes for all purposes to bore both straight and taper work. Pedrick & Ayer, proprietors, L. S. Flanders' Machine Works, 1025 Hamilton street, Philadelphia, Pa.

"Patent Binder" for the AMERICAN MACHINIST holds 52 weekly issues in good shape. Sent to any address by mail for one dollar. American Machinist Publishing Co., 96 Fulton street, New York.

Free—"Useful Hints on Steam." A book of 96 pages, illustrated. Valuable to engineers, steam users and those about purchasing steam machinery. By mail, 15 cents, or free on personal application. E. E. Roberts, 107 Liberty St., New York City.

Now ready for delivery, volume 5 of the AMERICAN MACHINIST, comprising the year 1882, (52 issues) complete with index, in substantial book form Also a few remaining of volumes 3 and 4 comprising the years 1880 and 1881, can be sent anywhere by express. Price of each volume, $4.00; express charges to follow. AMERICAN MACHINIST Publishing Company, 96 Fulton street, New York City.

Again the H. W. Johns Manufacturing Co., of 87 Maiden Lane, N. Y., are in the front rank in the matter of non-conducting coverings for steam pipes, boilers, &c. Their recent contracts comprise, among many others, the boilers and pipes of the Goodyear Rubber Co., at Middletown, Conn.; the New York Car Steam-Heating Co.; the New Scranton Steel Works, at Scranton, Pa., and the five boilers of the Pennsylvania Railroad Co.'s elevator. In the latter case their system of coverings is to replace another style which has proven to be comparatively worthless.

MANUFACTURES.

Eastern capitalists propose to erect a nail mill in the town of Winchester, Ky., in the course of the next six months.

It is stated that the new Cleveland, Akron & Columbus railroad shops at Mt. Vernon, O., are to be lighted with the Maxim incandescent lamp.

A. M. Baldwin, Montgomery, Ala., is interested in the establishment of a soap factory at that point, and is looking for suitable machinery.

The American Writing Machine Co., of New York City, are about to move to Corry, Pa. They will occupy a large shop formerly a locomotive works. They make the caligraph as an exclusive specialty.

John Acton, manufacturer of the Improved Bogardus Mill, Room 14, Harlem Railroad Depot, Franklin street, New York, reports general satisfaction from parties using the new mill. It grinds leather, horns, hoofs and other refractory substances to any degree of fineness. It takes up its own wear automatically.

The Worcester Machine Screw Company, Worcester, Mass, write us: Our business is good. We are running full time and our usual force of help, employing upwards of 80 persons. There has been no recent change in the price of our goods. There is a slight tendency to cut prices somewhat, but not to any great extent.

The big manufacturing concerns all over the country have been given valuable "pointers" on free advertising by a Cincinnati Safe and Lock Co., and are improving on the suggestion. Now it is a mammoth arms manufacturing concern in Hartford, Conn., that is about seeking a new location—and columns of free advertising in the papers of rival competing cities.—*Springfield, Ohio, Republic.*

The second glucose factory has failed and shut up shop in Iowa. It is said the glucose establishments that have recently failed in this state, cost nearly half a million dollars. It is a happy thing for people that this humbug doesn't pay. When the people have asked for sugar, they have received a miserable compound of sulphuric acid and corn—called glucose, that should never be allowed in our markets, unless under its own name.—*Iowa Tribune.*

Athol (Mass.) manufacturers who are dependent on water power, have been troubled the past winter, owing to the low water. This is the principal reason why several manufacturers on one of the smaller streams are contemplating moving their business to town and occupying places where there is steam power. Shoe manufacturers, who do not run much power, say they can run steam at a very moderate cost and have something they can depend upon every day in the year.—Boston *Commercial Bulletin.*

The Chickasaw Iron Works, Memphis, Tenn., write us: Our works are undergoing some changes. We are building a new addition to our foundry 50×100 feet, which will be provided with our new improved 10 ton cranes. We intend also putting up a core oven upon the plan suggested by one of your correspondents some time last year. So much for subscribing for a live, energetic paper. Business is very good for this season of the year, and if we have no serious overflow this spring we anticipate a good year.

It is stated that 300 employes of the Indianapolis rolling mill company have agreed to stand a reduction in wages, if the managers will resume operations. The best of feeling exists between the management and the men, and arrangements are being completed which will enable the mills to start up very soon.

The first locomotive ever constructed entire south of Louisville was turned out of the shops of the Alabama & Great Southern road at Chattanooga, February 1st. It is a powerful mogul machine, and the Chattanooga *Times* says it acted very handsomely on the trial trip. The entire engine, including bolts, nuts, rivets and castings, was the product of the Alabama & Great Southern shops.

It is stated that the Ranken Knitting Company of Cohoes, N. Y., have arranged for a new plan of co-operation in the running of their mills for the present year. They have given an interest in the profits of their business to their book-keepers, general superintendent, and the superintendent of each department. Eight persons in all will thus share in the profits of the mill. If the new departure proves a success this year, Henry S. Ranken, the treasurer, will seek to extend it so as to give its benefits to all the employes of the company.

The U. S. Illuminating Co., of 59 Liberty street, New York, have taken the contract to light the Brooklyn Bridge. Power will be furnished by two Corliss engines 12 by 28, built by Watts, Campbell & Co., of Newark, N. J. There will be 70 arc lights, and each engine runs half the entire plant, the lights being divided alternately, so that in case of the disabling of one of the engines, the remaining engine will still do duty in lighting the bridge. Four dynamos will be employed, two being 20 light and two being 15 light machines.

The annual meeting of the stockholders of the Billings & Spencer Company, Hartford, Conn., was held Feb. 19th, at which the old board of directors was elected, viz: C. E. Billings, W. A. Healey, C. M. Spencer, S. H. Holt, S. A. Barber, Silas Chapman, Jr., and E. H. Stocker. At a subsequent meeting the old officers were re-elected, viz.: C. E. Billings, President and Superintendent, S. H. Holt Treasurer, and E. H. Stocker, Secretary. The statement, exhibited showed a very prosperous condition of affairs. The business of the company was larger in 1882 than in any other year of its history. Its stock has appreciated very largely within a year or two.

The Pratt & Whitney Company of Hartford, Conn., have been awarded a medal which represents something of far more importance than the awards at industrial exhibitions. They have had conferred upon them the John Scott Legacy Medal awarded by the city of Philadelphia upon the recommendation of the Franklin Institute for standard gauges, taps and dies. This honor, coming as it did, unsolicited, is doubtless fully appreciated. The medal, which is of bronze, four inches in diameter, bears upon the obverse side the seal of the city of Philadelphia, and the words "Awarded by the City of Philadelphia" around the border. The reverse side has a laurel wreath around the center with the words "The John Scott Medal. To the Most Deserving." In the center is the inscription: "To the Pratt & Whitney Co., Hartford, Conn., for their Standard Gauges, Taps and Dies, upon the recommendation of the Franklin Institute."

The following report of the operation of one of the Davidson Steam Pump Company's pumps was recently made to the Bureau of Steam Engineering, Navy Department, by engineers Smith, Lowe and Bailie: "In obedience to your order of March 31st, 1882, and in accordance with the instructions of the Bureau of Steam Engineering, we have carefully tested 'Davidson's Improved Steam Pump,' and respectfully report as follows: The pump presented for trial has the following dimensions; diameter steam cylinder 7 inches, diameter water cylinder 4 inches, stroke 10 inches. It is direct-acting, the steam valve which has a cylindrical face being actuated by an attachment to the main piston rod. This valve in addition to its reciprocating motion, is oscillated by an oblique cam and thus, by a peculiar arrangement of ports, steam is admitted alternately to each end of the valve chest, where it acts upon the piston attached to the valve, insuring its reciprocating movement independently of the mechanical operation of the cam. By means of this arrangement the pump will start from any point of the stroke. The water cylinder, valves, &c., are very easy of access, with no inside joints requiring the removal of bonnets to overhaul them. Each pair of receiving and delivery valves, which are made of gum, can be removed by unscrewing a single stud, which requires but a moment, and taken as a whole the pump is very simple in construction. In making the test, the pump was attached to the machine shop boiler, and has been in operation since April 1st, working against a pressure of fifty pounds of steam, and giving entire satisfaction. For the greater part of this time it has supplied water, having an average temperature of 190° Fahr., starting instantly when the throttle was opened, and running when necessary at the slowest possible speed, without failing in its reciprocating motion. Tested as a fire pump it threw a stream through a ⅝″ nozzle to a distance of 108 feet, the pump making 160 strokes per minute, with 52 pounds of steam. At this speed it ran almost noiselessly. In our opinion this pump is durable, and possesses advantages for purposes coming under the cognizance of the Bureau, and we recommend its purchase and use."

Machinists' and Engineers' Supplies.

New York, March 1, 1883.

Small orders for tools and general supplies are now coming in quite rapidly, and there has been unquestionably a decided improvement in this line during the past week.

The E. Horton & Son Co., Windsor Locks, Conn., have issued a new catalogue and price list containing engravings with descriptions of their specialties. Several chucks of new design are included in this descriptive list.

The Brown & Sharpe Mfg. Co., Providence, R. I., have just completed their new catalogue and price-list for 1883. This book is of a convenient size for the pocket, and contains much valuable matter for reference in mechanical pursuits.

Iron and Metal Review.

An unsettled state of feeling still pervades the Pig Iron market and consumers adhere to their now chronic hand-to-mouth policy in purchasing. Prices continue unchanged, both for American and Foreign brands. There are no changes worthy of note in the prices of other metals this week.

WANTED

"Situation and Help" Advertisements, 30 cents for each seven words (one line) each insertion. Copy should be sent to reach us not later than Thursday morning for the ensuing week's issue.

An experienced draughtsman desires re-engagement. Address C. S. B., care Am. Machinist.

Wanted—An experienced foundry man to act as foreman of a small foundry. "Winter," care American Machinist.

Wanted—A competent salesman for a well known first-class steam engine. Address, with reference, B., this office.

Wanted—A junior draughtsman; an efficient tracer, accustomed to tool work preferred. Verax, Post-office, Worcester, Mass.

A mechanical engineer, now superintendent, desires a position as draughtsman, superintendent or manager. Address, M., American Machinist office.

Wanted—Good practical man, having a thorough knowledge of the manufacture of mower and reaper knives, to take charge. Address, "Chance," American Machinist.

Wanted—A competent foreman to take charge of general machinery foundry; must have good reference. Address, Castings, care American Machinist.

Wanted—Situation by a practical foundryman as foreman. Has had long experience in all branches, and in handling men. Address, Foundryman, this office.

Machinists wanted—Two lathe hands, one planer hand and machinery moulder. Strictly first-class, none other need apply. Steady employment. Good wages. McEwen Bros., Wellsville, N. Y.

Wanted—10 to 15 first-class machinery moulders, *non-union*; steady employment given. Wages $2.50 to $3.00 per day. Keystone Iron Works Co., Kansas City, Mo.

Wanted—Situation as foreman of foundry by one of 12 years' experience, who understands the trade in all its branches; for ability and push can furnish best of references. Address, Penna, care American Machinist.

Wanted—A first class traveling salesman to sell wood working machinery. Must be thoroughly conversant with the use of machinery. A man of experience preferred. Address, giving age, experience and present occupation, G. K., care of American Machinist.

Wanted—A man to take charge of an out of town machine shop, manufacturing medium sized, first-class special machinery, and employing from 100 to 200 men. A thoroughly competent man accustomed to making such machinery as lathes or first-class engines, can have a good position by addressing, Box 4, care American Machinist, 96 Fulton street.

Wanted—A position as superintendent or general foreman, by an experienced machinist, competent to manage large bodies of men in the several departments, accustomed to machine tool work, stationary engines and portable engines; would prefer a position where an interest in the business can be had, where the man is wanted more than the money. Reference furnished. Address, Supt., American Machinist.

Wanted—A superintendent for an old and well established foundry, machine and boiler shop. Must be a well educated and practical mechanic of *experience*, a good draughtsman and thoroughly conversant with the building of rolling mill and blast furnace machinery in all its details, and a good designer generally. Must have good executive ability and first-class reference both as to character and efficiency. Address, Superintendent, Box 11, American Machinist.

A fairly equipped foundry and machine shop located in county seat and close to railroad, another to cross near shop, another in prospect; large territory; all for $2,000 if sold by April 1st. Terms reasonable. D. C. Baughman, Albion, Ind.

AN UNUSUAL BUSINESS OPPORTUNITY. On account of ill health, requiring an absence from active duties for a year or two, a gentleman controlling one of the most successful business corporations in a large Western city, established for more than twenty-five years, and having a valuable good-will, is disposed to sell half his holdings. Purchaser must be a man of good business judgment, correct habits and irreproachable character. Will be expected to take charge of the collections, credits and finances at a salary of $2,400 a year. The stock for three years past has averaged net earnings of 48 per cent. per annum. It will require $25,000 cash or its equivalent, to make the purchase. First-class references given and required. Address, "MANUFACTURER," Care Corn Exchange National Bank, Philadelphia, Pa.

THOMPSON & HOLMES CHUCKS

MAKERS OF ALL KINDS & SIZES.

Send for Catalogue to

JAMES D. FOOT, Sole Agent,
No. 101 CHAMBERS STREET, NEW YORK.

FOR SALE.

We have the following second-hand Machinery for sale, viz.:

One Iron Planer, to plane 24 feet long, 62 in. x 62 in. square. It is powerfully geared, heavy and in good order.

One Iron Planer, to plane 12 feet long, 36 in. x 32 in. in fair condition.

One Pit Lathe, face plate 6 feet dia., with internal wheel full dia., external wheel 38 in. dia., quadruple geared, will turn 10 feet dia. and 22 in. face in pit, swing 60 in. over ways, 48 in. over carriage, 21 ft. 6 in. between centers. All complete.

One Engine Lathe, will take 14 feet between centers, and swing 53 in over ways, has hollow spindle, and is adapted for both turning and boring, with countershaft. Complete.

One Engine Lathe, will take in 11 feet, 6 inches between centers, swings 48 inches over shears, and 32 inches over carriage. It has internal gear, and cross-feed, with countershaft. All complete.

One Slotting Machine, 12 in. stroke, slots to the center of 46 in. Adjustable table and universal feed motion.

One Combined Power Punch and Shears, to punch ⅝ and ½, and shear ½ in. iron.

Send for Monthly list of New Machinery.

The George Place Machinery Co.,
121 CHAMBERS and 103 READE STREETS,
NEW YORK.

JOSIAH MACY'S SONS,

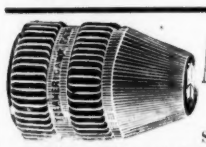
189 & 191 Front Street, New York,
MANUFACTURERS OF

LUBRICATING OILS,

Lard, Sperm, Whale and the
"UNICORN,"

Brands of all gravities, suitable for all grades of work; light, heavy, slow and high speed.

Samples Submitted Free. Established 1822.



THE American Drill Chuck

Is the cheapest 3-parallel Jaw Chuck. Price, $4.

Sold by all Tool Dealers.

BREHMER BROS., 440 North 12th Street, Philadelphia, Pa.

H. W. JOHNS' ASBESTOS

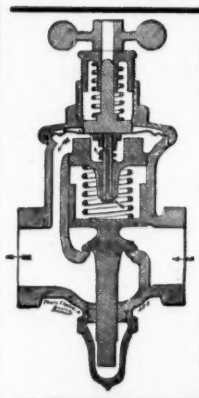
STEAM PIPE AND BOILER

COVERINGS

Steam Packing, Millboard, Sheathing, Building Felt, Liquid Paints, Roofing, &c.

DESCRIPTIVE PRICE LIST AND SAMPLES SENT FREE.

H. W. JOHNS MFG. CO., 87 Maiden Lane, N. Y.



CURTIS
Pressure Regulator

For Steam, Water and Air,

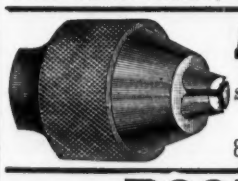
MANUFACTURED BY

Curtis Regulator Co.
51 BEVERLY ST.,
Boston, - - Mass.

General Agencies:
109 Liberty St., New York.
925 Market St., Phila., Pa.
80 Market St., Chicago, Ill.
Cor Holliday and Saratoga Streets, Baltimore.

T. NEW'S PREPARED ROOFING.

For steep or flat roofs. Applied by ordinary workmen at one-third the cost of tin. Circulars and samples free. Agents Wanted. T. NEW, 38 John Street, New York.



Almond Drill Chuck

Sold at all Machinists' Supply Stores.

T. R. ALMOND,
84 Pearl St., Brooklyn, N.Y

ROOTS'
Improved Force Blast Blower

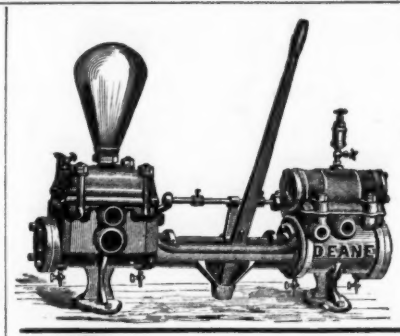
(Outside view.) (Inside view.)

Is perfectly balanced, more simple in design and requires less power than any other.

COOKE & CO.,
12 Cortlandt Street, New York,
SELLING AGENTS.

Blacksmiths' Hand Blowers, Portable Forges, Tuyere Irons, and Gas Exhausters.

Please send for circular and state that you saw the advertisement in this paper.



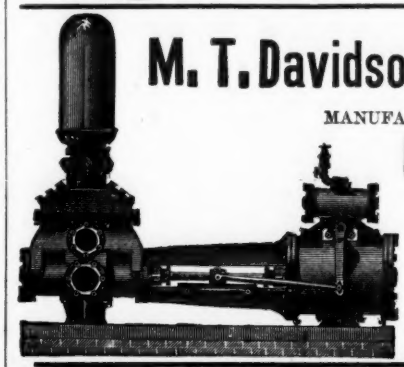
"THE DEANE"

Steam Pumps for Every Service.

Send for New Illustrated Catalogue.

THE DEANE STEAM PUMP CO.,
HOLYOKE, MASS.

92 & 94 Liberty St., NEW YORK. 54 Oliver St., BOSTON. 226 & 228 Lake St., CHICAGO.



THE
M. T. Davidson Improved Steam Pump,

MANUFACTURED BY

Davidson Steam Pump Co.,

OFFICE & WORKS:
41 to 47 KEAP STREET, BROOKLYN, N. Y.

Warranted the Best Pump made for all Situations.

KELLY & LUDWIG, Agents,
49 & 51 North 7th St., Philadelphia.

THE HERCULES TURBINE

Gives more power for the same size, also better average results from full to one-half gate than any other water wheel ever made. It is moderate in cost, compact in form, and not liable to get out of order.

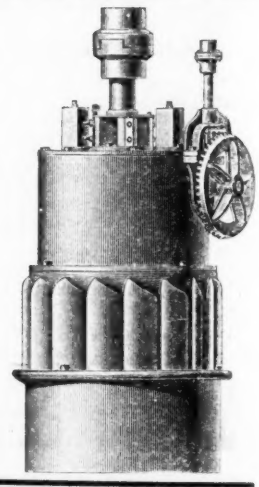
—BUILT BY—

THE HOLYOKE MACHINE CO.

SHOPS AT

Holyoke and Worcester, Mass.

Send for Catalogue, Circulars and Price List to either of the above places.

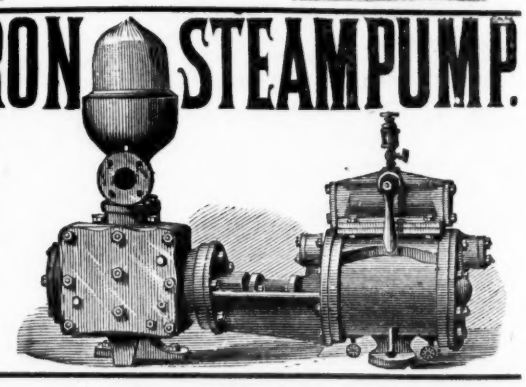


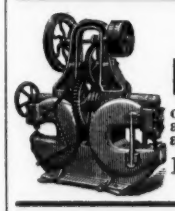
THE CAMERON STEAMPUMP.

Is the Standard of Excellence

AT HOME AND ABROAD.

THE A. S. CAMERON
STEAM PUMP WORKS,
Foot of East 23d Street, New York.





FOR A COMBINED
Punch and Shears

of beautiful design, of great strength and capacity, and thoroughly reliable, address

Lambertville Iron Works,
LAMBERTVILLE, N. J.

A Great Economic Discovery.

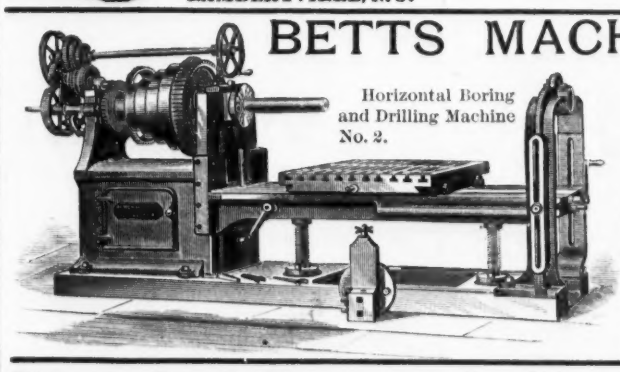
The Universal Coal Saver & Gas Consumer.

This preparation when applied saves 25 per cent. of the Coal.

Write for particulars,

F. E. McALLISTER, Sole Agt,
31 Fulton St., New York.

BETTS MACHINE CO.,



Horizontal Boring and Drilling Machine No. 2.

WILMINGTON, DEL.

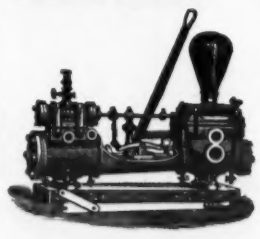
BUILDERS OF

HEAVY
Machine Tools

FOR

RAILWAY AND MACHINE SHOPS.

Knowles' Improved Steam Pumps,



THE STANDARD!

Steam Pumps for Every Possible Service.

SEND FOR ILLUSTRATED CATALOGUE.

KNOWLES STEAM PUMP WORKS,

86 Liberty Street, NEW YORK.

44 Washington Street, BOSTON.

NICHOLSON FILE CO.,

SOLE MANUFACTURERS OF

FILES AND RASPS

HAVING THE INCREMENT CUT.

Also, FILERS' TOOLS AND SPECIALTIES.

"Nicholson File Co's" Files and Rasps, "Double Ender" Saw Files, "Slim" Saw Files, "Bacer" Horse Rasps, Handled Rifflers, Machinists' Scrapers, File Brushes, File Cards, Surface File Holders, Vise File Holders, Stub Files and Holders, Improved Butchers' Steels

Manufactory and Offices at PROVIDENCE, R. I.- U. S. A.

AMOS WHITELY, Pres't. OFFICE OF CHAS. A. BAUER, Sup't.
CHAMPION KNIFE & BAR CO., Springfield, O.

THE ASHCROFT MFG. CO., 111 Liberty Street, New York.

You ask me "How I am pleased with my pair of Tabor Indicators." In reply, would say that I have *tested* and *inspected* them *thoroughly*, and am now more than pleased with them. The workmanship is the *best* I ever saw. I consider the instrument about perfect. You certainly have given the Indicator a great deal of attention, to bring it to such a state of perfection.

Yours very truly, CHAS. A. BAUER.

West Bay City, Mich., February 16th, 1882.

THE CONSOLIDATED SAFETY VALVE CO., New York,

Gentlemen:—The 5-inch Nickel-Seated Pop Safety Valves, which have been in use on our Mill boilers for about ten years, have given entire satisfaction. They have *never corroded* any, *never stick*, and always go off at the pressure at which they are set, and are now in as good condition as when new. We could not dispense with that style of valve and feel safe.

Yours respectfully, H. W. SAGE & CO.

Bay City, Mich., February 17th, 1882.

CONSOLIDATED SAFETY VALVE CO., 111 Liberty St., New York,

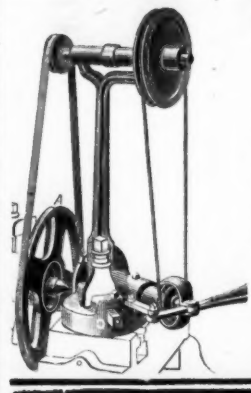
Gentlemen:—We have used your 5-inch Patent Nickel-Seated "Pop" Safety Valves about *ten years*, on our Mill boilers, and they have given entire satisfaction, and we would not feel safe to run our mill without them. They open at the fixed working pressure and never get out of order.

Respectfully yours, EDDY, AVERY & EDDY.

Bay City, Mich., February 18th, 1882.

CONSOLIDATED SAFETY VALVE CO., New York,

Gentlemen:—We have used the Ashcroft Nickel-Seated Valve for the past ten years, and consider it reliable in every particular for what it is designed. We consider it the best valve we have ever seen, and should we need a Steam Valve, would buy the Ashcroft rather than to have and other we have ever seen, given us. Respectfully yours, GATES & FAY.



CENTRE GRINDER

For truing hardened centres and keeping true, without removing from lathe, or drawing temper.

Simple, quickly adjusted to any lathe, and does its work perfectly.

Price complete, with emery wheel, boxed, $15.

Send for circular to

Trump Bros. Mach. Co.,

Manufacturers,

Wilmington, Del., U.S.A.

C. W. LE COUNT, South Norwalk, Conn.

LE COUNT'S HEAVY STEEL DOG,

With Steel Screws. Lathe Made and Hardened.

This dog is very heavy, and is warranted not to break with any work

No. 1	3-8 in.	$ .50
" 2	1-2 "	.60
" 3	5-8 "	.70
" 4	3-4 "	.70
" 5	7-8 "	.80
" 6	1 "	.80
" 7	1 1-8 "	.95
" 8	1 1-4 "	.95
" 9	1 3-8 "	1.10
" 10	1 1-2 "	1.10
" 11	1 3-4 "	1.25
" 12	2 "	1.40
" 13	2 1-4 "	1.60
" 14	2 1-2 "	1.60
" 15	3 "	1.80
" 16	3 1-2 "	2.00
" 17	4 "	2.30
" 18	4 1-2 "	3.00
" 19	5 "	3.50
Full set, 19 Dogs,		26.35
No. 20	5 1-2 in.	4.25
" 21	6 "	5.00

When ordering, state as above, whether a full set or a set of 11, or smallest of 8. Users of these dogs prefer them to any other make.

No 1	3-8 in.	$ .50
"	1-2 "	.60
" 4	3-4 "	.70
" 6	1 "	.80
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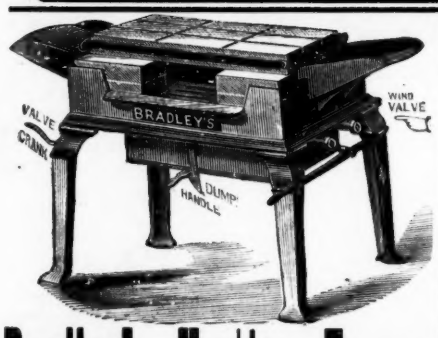

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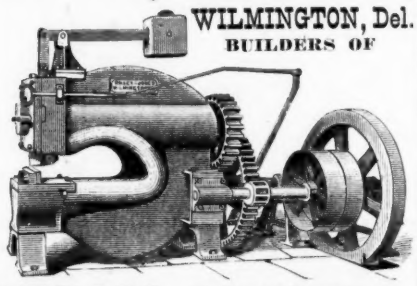

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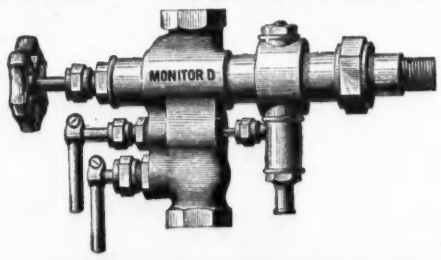

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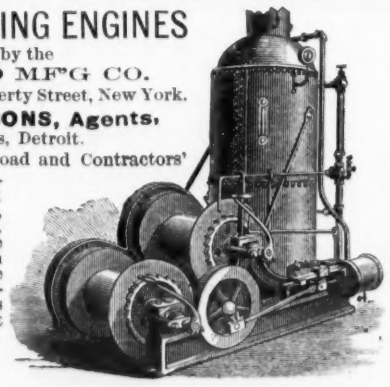

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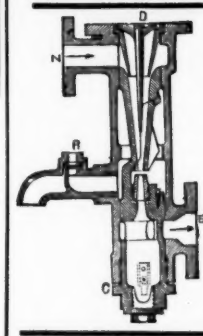

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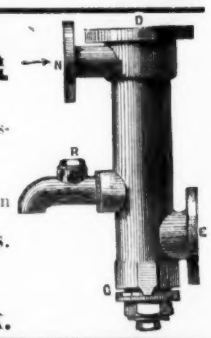

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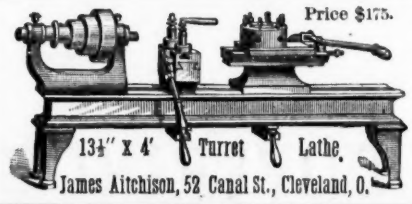

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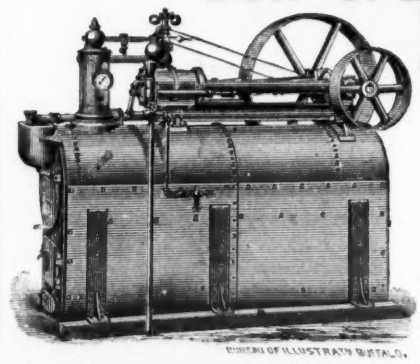

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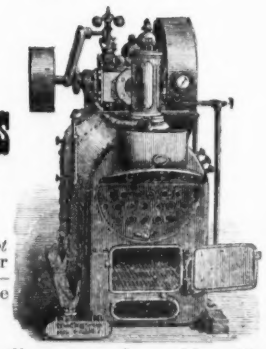

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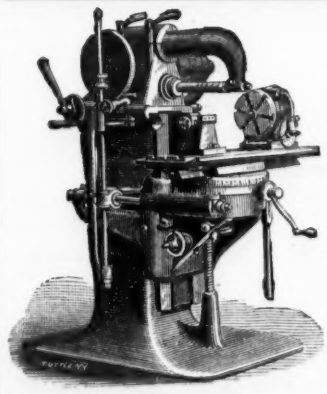

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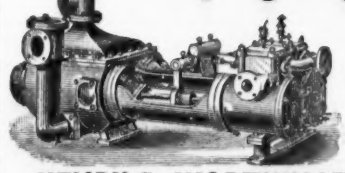

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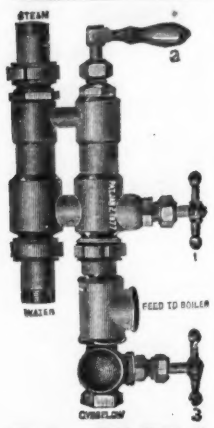

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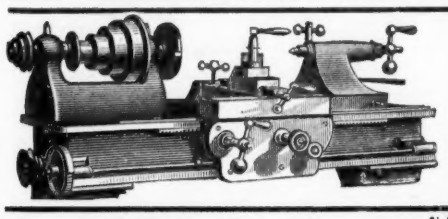

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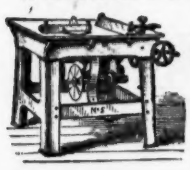

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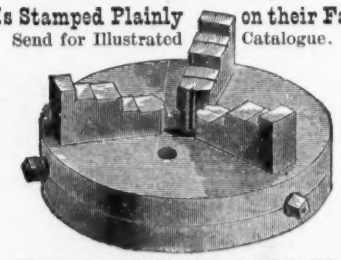

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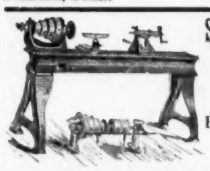

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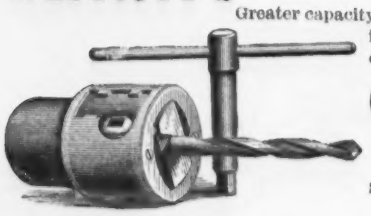

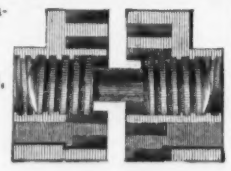

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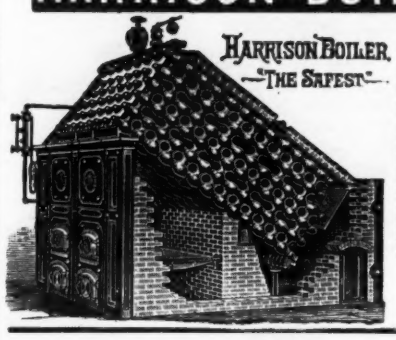

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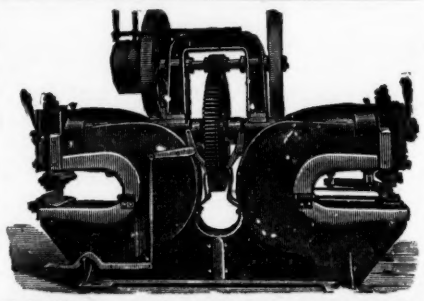

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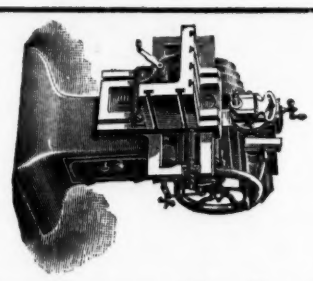

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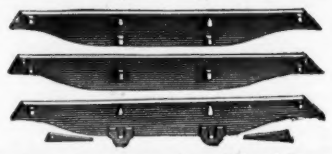

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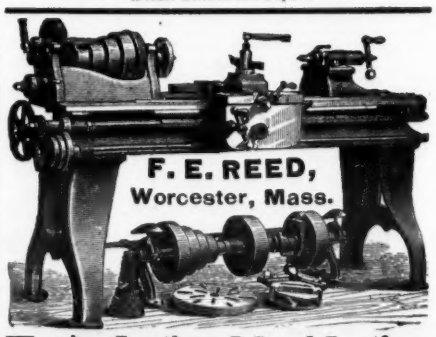

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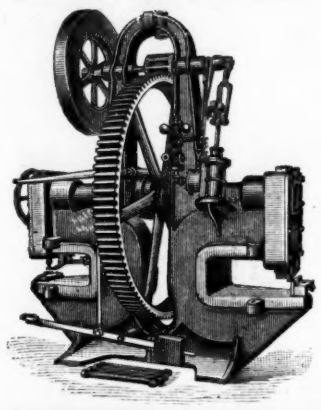

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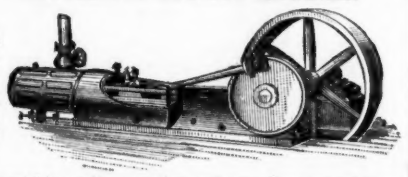

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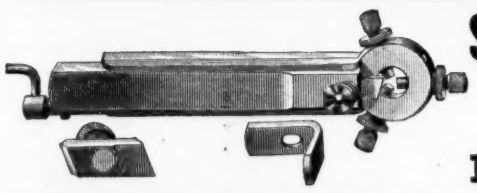

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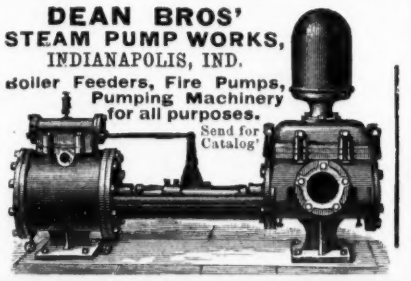

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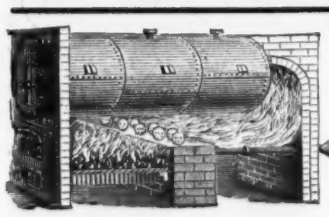

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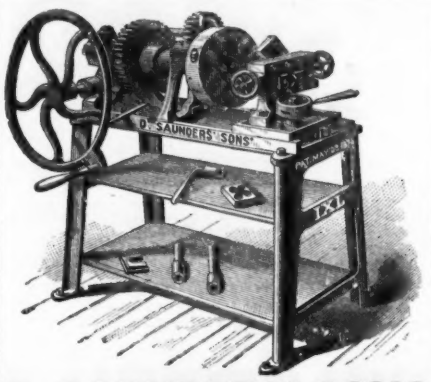

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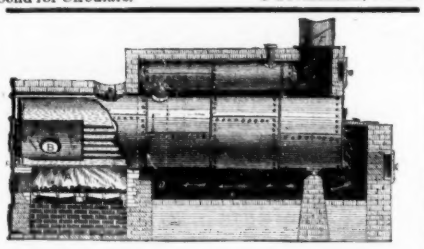

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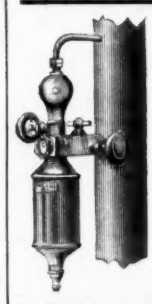

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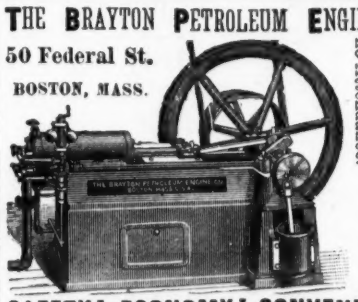

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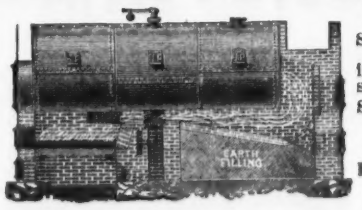

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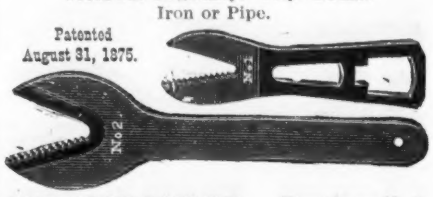

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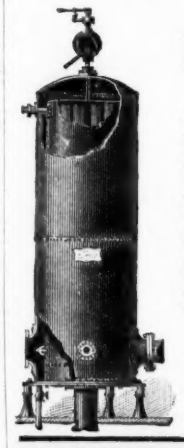

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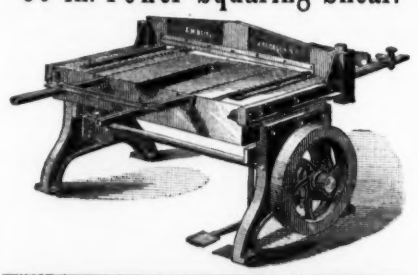

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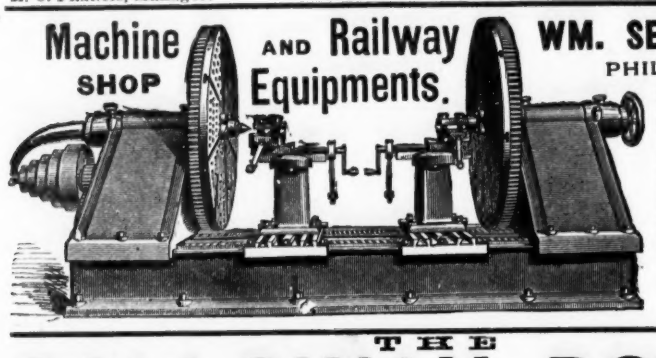

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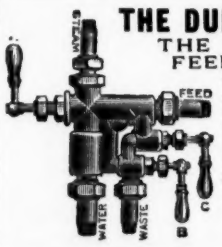

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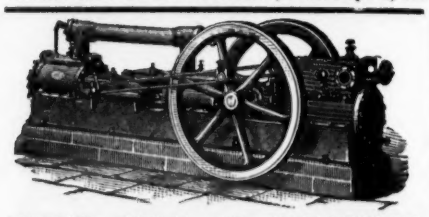

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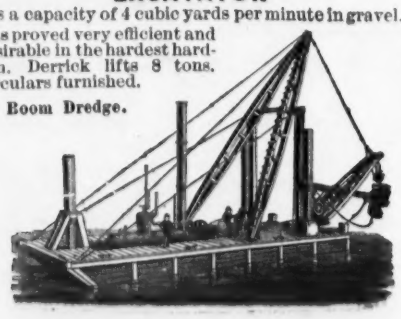

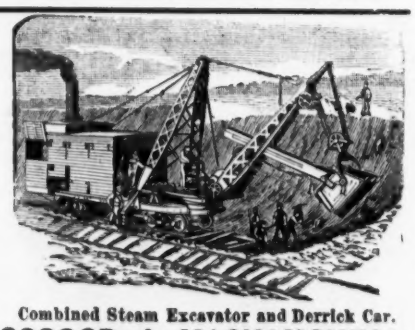

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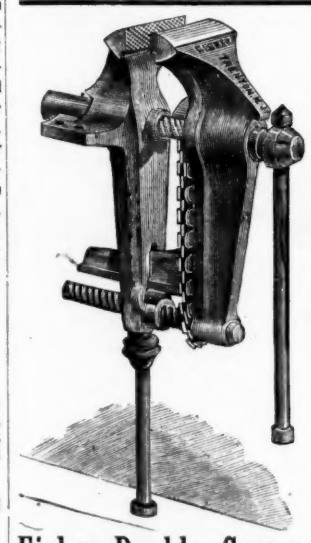

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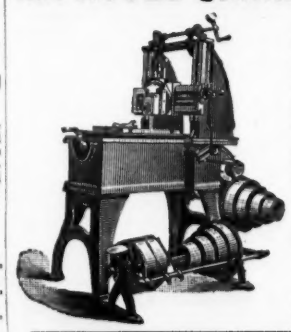

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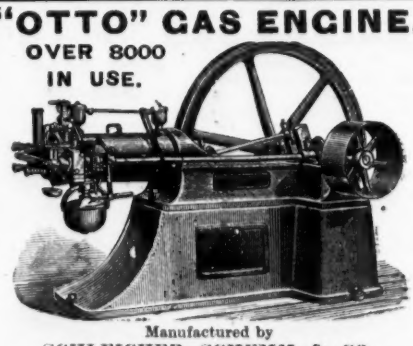

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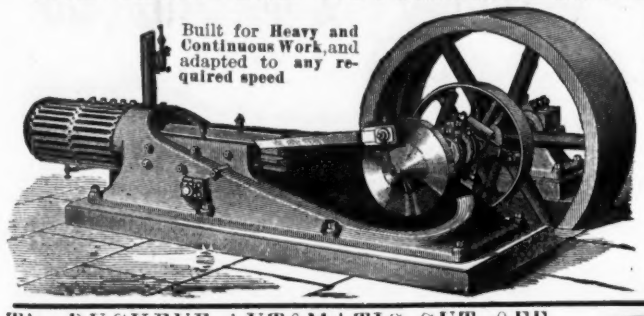

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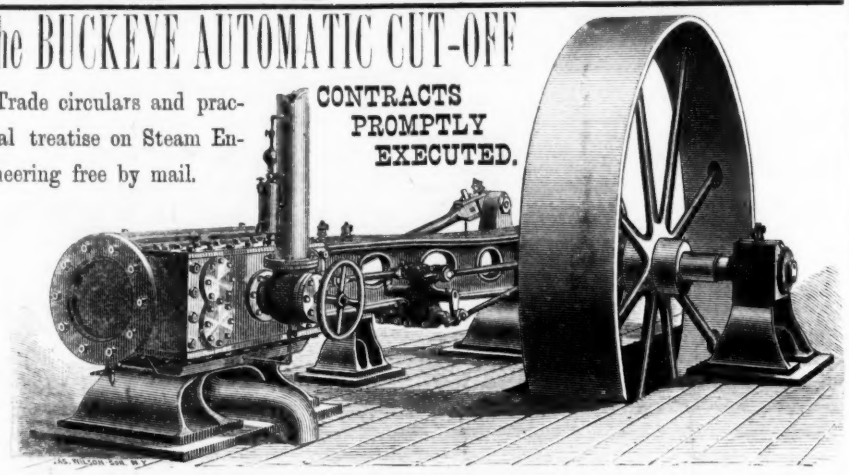

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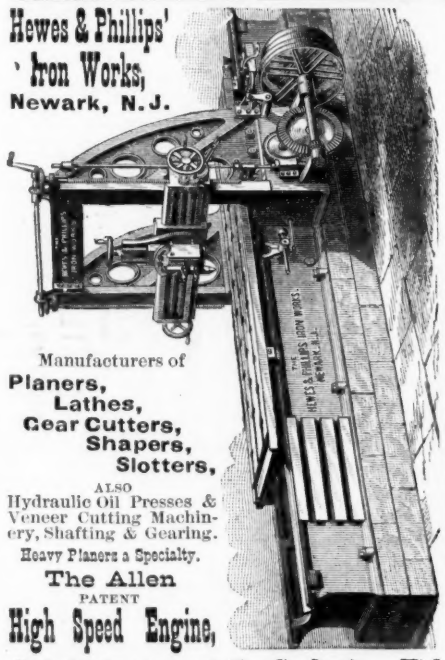

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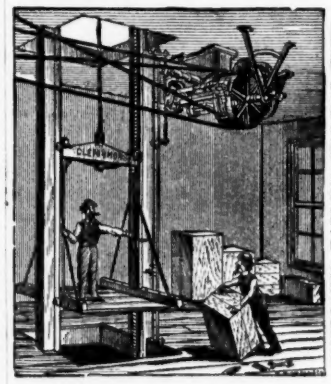

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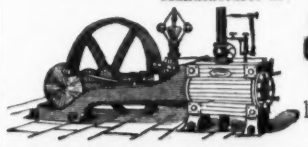

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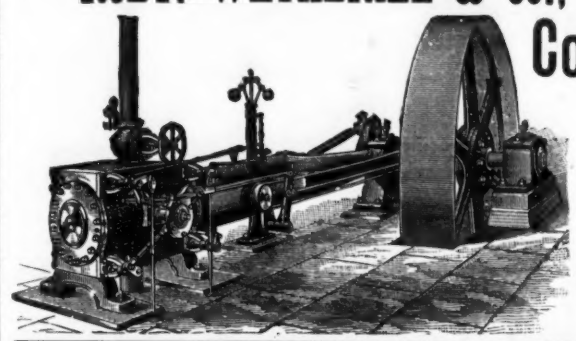

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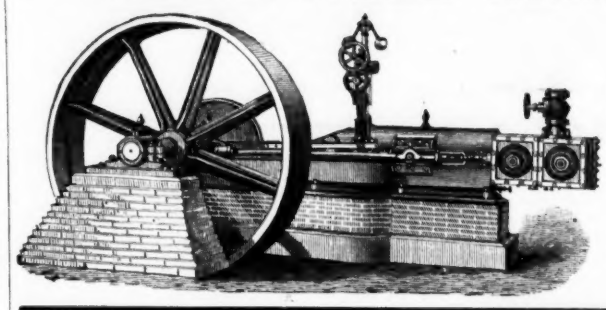

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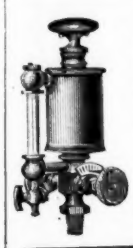

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1 " " 18 in. x8 & 10 ft. Lodge & Barker "
1 " " 27 in. x 10 in. Lodge & Barker.
1 " " 22 in. x 12 ft. "
1 " " 20 in. x 10 ft. New.
1 " " 28 in. x 16 ft. New.
1 " " 24 in. x 12, 14 and 16 ft. New.
1 " " 11 in. x 4 ft. & 5 ft. Prentiss. New.
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1 15 in. x 4 ft. Turret Lathe. Lodge & Barker.
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1 Planer, 50 in. x 50 in. x 17 ft. Good Order.
1 " 32 in. x 32 in. x 7 ft. Good Order.
1 " 16 in. x 16 in. x 3 ft. New.
1 " 22 in. x 20 in. x 5 ft. "
1 " 24 in. x 24 in. x 6 ft. Hendey. new
1 " 26 in. x 26 in. x 7 ft. "
1 " 16 in. Lever Table Drill. New.
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1 16 in. Upright Drill. "
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1 24 in. " " Prentiss. "
1 30 in. " " " "
1 25 in. swing B.G. & S.F. Drill. Blaisdell. "
1 28 in. " " " " "
1 15 in. Shaper. Gould & Eberhardt.
1 10 in. Shaper. Gould & Eberhardt. New.
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1 24 in. Shaper. Hendey. "
1 16 in. Shaper. Hendey. Good Order.
1 9 in. Shaper. Hewes & Phillips. "
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1 each Nos. 2 & 4 Screw Machines, Wire Feed, Jones & Lamson.
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1 42 in. swing 20 ft. bed. Engine Lathe. 2 weeks.
1 42 in. " 16 ft. " " " 2 "
1 36 in. " 18 ft. " " " 2 "
1 36 in. " 16 ft. " " " 2 "
1 New Corliss Engine, 16 in. x 42 in. Complete in four weeks. The following on hand:
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1 26 in. swing, 12 ft. bed, New Engine Lathe.
1 each, 30 in. " 14, 16 & 18 ft. bed. " "
1 22 in. swing, 12 ft. bed, New Engine Lathe.
1 19 in " 10 ft. " " " "
1 19 in " 8 ft. " " " "
6 18 in. " 8 ft. " " " "
5 15 in. " 6 ft. " " " "
1 10 in. " 5 ft. " " " "
1 30 in. " 12½ ft. " " " "
1 26 in. swing, 14 ft. bed. " " "
1 Axle Lathe. Fitchburgh Machine Co. Sec'd. Hand.
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1 26 in. x 6 ft. " " "
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2 22 in. x 4 ft. " " "
2 38 in. Swing Upright Drills. B. G. & S. F.
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1 23 in. & 3, 20 in. Drills. Plain.
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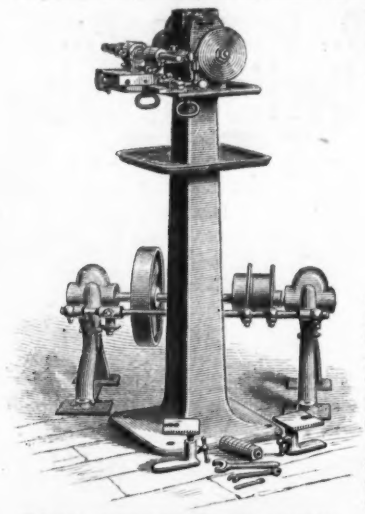

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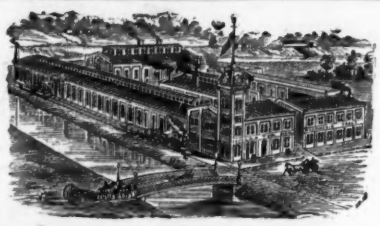

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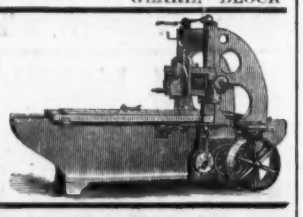

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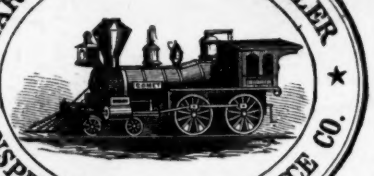

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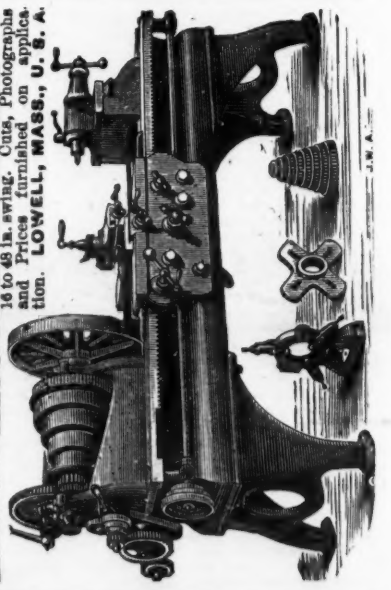

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